



# REQUEST FOR CEO APPROVAL

PROJECT TYPE: MEDIUM-SIZED PROJECT

TYPE OF TRUST FUND: GEF TRUST FUND

## PART I: PROJECT INFORMATION

Project Title: Biomass energy for productive use for small and medium enterprises (SMEs) in the olive oil sector			
Country(ies):	Albania	GEF Project ID: <sup>1</sup>	5342
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	120536
Other Executing Partner(s):	Ministry of Environment (MoE); Ministry of Energy and Industry (MEI); National Agency for Natural Resources (NANR); Ministry of Agriculture and Food (MAF); Agriculture and Rural Development Agency (ARDA); Albanian Association of Olive Oil Producers (AAOOP)	Submission Date: Resubmission Date:	07-02-2014 07-29-2014
GEF Focal Area (s):	Climate Change	Project Duration(Months)	36
Name of Parent Program (if applicable): ➤ For SFM/REDD+ <input type="checkbox"/> ➤ For SGP <input type="checkbox"/> ➤ For PPP <input type="checkbox"/>		Project Agency Fee (\$):	88,065

## A. FOCAL AREA STRATEGY FRAMEWORK<sup>2</sup>

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount (\$)	Cofinancing (\$)
CCM-3	Outcome 3.2.: Investment in RE Technologies increased	Output 3.3: Electricity and heat produced from renewable sources	GEF TF	927,000	4,507,000
<b>Total project costs</b>				927,000	4,507,000

## B. PROJECT FRAMEWORK

**Project Objective:** Increase the use of biomass in industrial energy consumption for productive use through demonstrated use of modern biomass technologies in Small and Medium-sized Enterprises (SMEs) in the olive oil industry

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount (\$)	Confirmed Cofinancing (\$)
1. Technology demonstrated for use of modern biomass technologies in industrial processes in Albania	TA	1.1 Increased utilisation of industrial biomass waste for energy purposes through technological innovation to trigger transformation of the olive oil industry	1.1.1 A minimum of 15 business plans and feasibility studies developed for demonstration plants in SMEs using olive solid residues for the production of energy 1.1.2 Financing secured for a minimum of 15 demonstration plants	GEF TF	115,000	575,000
	INV		1.1.3 Demonstration plants built at a minimum of 15 olive oil industries with an estimated total capacity		375,000	1,875,000

<sup>1</sup> Project ID number will be assigned by GEFSEC.

<sup>2</sup> Refer to the [Focal Area Results Framework and LDCF/SCCF Framework](#) when completing Table A.

			of 1- 1.5 MW <sub>th</sub>			
2. The enabling market and regulatory environment for biomass technology in industry created in Albania	TA	<p>2.1 Strengthened capacities on the application of modern biomass technologies for key actors in the policy and industrial sectors in the olive oil and other sectors with high replication potential</p> <p>2.2 Detailed assessment of the biomass potential for industrial uses and the way forward for replication developed</p> <p>2.3 Pipeline of project for replication developed and supportive regulatory environment created</p>	<p>2.1.1 200 policy-makers, industry representatives and investors made aware and trained to understand the benefits of modern biomass and new technologies through 5 training workshops, dissemination of best practices and guidebooks for policy makers, project developers and investors on the procedures and development process of an industrial biomass project</p> <p>2.2.1 Short- and medium-term potential for modern biomass applications for industrial uses assessed, and the way forward for replication across sectors developed</p> <p>2.3.1 Approximately 30 projects prepared for replication in facilities using modern biomass technologies</p> <p>2.3.2 Tailored regulatory initiatives taken to ensure a sustainable expansion of biomass energy use across industrial sectors</p>	GEF TF	310,000	1,550,000
3. Monitoring and Evaluation and Knowledge Management	TA	3.1 Project's progress towards goals confirmed and/or necessary adjustments made	<p>3.1.1 Midterm review and final evaluation carried out; project's progress assessed, documented and recommended actions formulated;</p> <p>3.1.2 Knowledge gained shared with project partners</p>	GEF TF	45,000	180,000
Subtotal					845,000	4,180,000
Project Management Cost (PMC) <sup>3</sup>					82,000	327,000
Total Project Cost					<b>927,000</b>	<b>4,507,000</b>

<sup>3</sup> To be calculated as percent of subtotal.

**C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)**

Please include letters confirming cofinancing for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
National Government	Ministry of Environment	Cash	80,000
National Government	Ministry of Environment	In-kind	100,000
National Government	Ministry of Energy and Industry	Cash	590,000
National Government	Ministry of Energy and Industry	In-kind	590,000
Private sector	Target enterprises	Cash	225,000
GEF Agency	UNIDO	Cash	50,000
GEF Agency	UNIDO	In-kind	50,000
Local financial institutions	BKT	Cash (Loan)	942,000
Local financial institutions	Pro Credit	Cash (Loan)	940,000
Local financial institutions	Credins	Cash (Loan)	940,000
<b>Total Co-financing</b>			<b>4,507,000</b>

**D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY<sup>1</sup>**

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global	(in \$)		
				Grant Amount (a)	Agency Fee (b) <sup>2</sup>	Total c=a+b
<b>Total Grant Resources</b>						

<sup>1</sup> In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this

table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

<sup>2</sup> Indicate fees related to this project.

**F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:**

Component	Grant Amount (\$)	Cofinancing (\$)	Project Total (\$)
International Consultants	108,000	24,000	132,000
National/Local Consultants	284,000	796,000	1,080,000

**G. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? No**

(If non-grant instruments are used, provide in Annex D an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF/NPIF Trust Fund).

There are no expected reflows from this project.

## **PART II: PROJECT JUSTIFICATION**

### **A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF<sup>4</sup>**

#### **A.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.**

The project reflects the Government of Albania's (GoA) priorities to promote sustainable development and, as a member of the European Energy Community, its commitment to apply European legislation on renewable energy (RE), which sets specific targets for the share of RE in final energy consumption. The primary provision of the European Union's (EU) Renewable Energy Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market (2009/28/EC, further referred to as the EU RES Directive) is the setting of mandatory targets for increasing the proportion of energy from renewable sources in the electricity, heat and transport sectors by 2020. The Directive sets an overall target of 20% for the EU and individual targets for Member States based on their existing level of RE and their level of economic development; Albania's target share of renewable energy is expected to increase to around 38% by 2020. This government commitment is reflected in Albania's National Strategy of Energy of June 2003 and the Draft Updated Strategy of 2008 which has as its objective the reduction of Albania's fossil fuel consumption through promotion of energy efficiency (EE) and renewable energy (RE), thus reducing the country's reliance on imported fuels and strengthening the competitiveness of its industries. The estimates in the updated Energy Strategy show a significant potential increase in the extraction and utilization of biomass in Albania from forestry, agriculture and livestock (for biogas production).

To implement the national strategy, the GoA has drafted three key laws for approval by the Albanian Parliament; one law covers the power sector, one energy efficiency and one renewable energy sources (the RES law). The EU RES Directive has been transposed into the RES Law and in the approved Biofuels Law. The RES law was approved in May 2013 and the new Government has announced it is going to improve it especially for a faster promotion of RES in general with a particular focus on biomass energy. Albanian energy institutions are currently working to prepare the respective secondary regulations. The Biofuels Law has also introduced incentives for the use of biofuels in the transport sector such as:

- Compulsory blending of biofuels with mineral oil derivatives;
- Reduced rate of excise duty for biofuel blends of a specified percentage;
- Zero rate of excise duty for pure biofuels.

Together these laws intend to liberalize the electricity market, increase competition, promote efficiency, boost RES development in all economic sectors including industrial sectors, and attract foreign investment in the RE sector.

A draft National RE Action Plan (NREAP) has also been prepared by the Ministry of Energy and Industry (MEI), which established a good basis for increasing the contribution of biomass for energy uses, in particular its utilisation in the sub-industrial sectors of olive oil production. These policy initiatives demonstrate the willingness of the government to move forward on modern biomass utilisation. Yet, the market development is still faced with important bottlenecks, such as the availability of affordable project finance (due to both relatively unknown technologies and high equity requests of around 40 to 50%, and high interest rates), availability of technologies and technical capacities, complicated project approval processes and a low awareness of the potential and benefits of modern biomass utilisation in the olive oil sector.

The project is also consistent with the First<sup>5</sup> & Second<sup>6</sup> (the Third is under preparation) National Communications of Albania to United Nations Framework convention on Climate Change (UNFCCC) prepared with the support of GEF/UNDP with its focus on promotion of RES and EE to implement GHG mitigation scenario. According to the mitigation scenarios it requests to set targets for the share of energy from renewable sources in 2020 in the following sectors: heating and cooling, electricity and transport.

The targets suggest that modern biomass (including industrial biomasses from the olive oil industry) will

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<sup>4</sup> For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter "NA" after the respective question.

<sup>5</sup> 2004

<sup>6</sup> 2009

contribute about 35-40% of the targets related to heating whilst biofuel will provide up to 10% of total fuel consumption in the transport sector in order to reach the targets in transport. The project, with its focus on an increased use of olive oil and other industrial organic waste streams is clearly in line with these Government objectives.

## **A.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities**

The project will contribute to the GEF Climate Change Strategic Objective 3: Promote investment in renewable energy technologies. The project aims to transform the market for using organic waste from the olive oil and other industries for energy production. It aims to achieve this through triggering investment in organic olive and other industry waste-to energy projects, through market demonstration, development of appropriate financial instruments, capacity building and by strengthening the policy and regulatory environment. Setting up the market environment that allows and promotes the use and replication of such technologies will lead to significant GHG emission reductions and help Albania in its transformation towards low carbon development.

## **A.3 The GEF Agency's comparative advantage**

Since its establishment, UNIDO has built up a long track record assisting countries to implement industrial support programmes. UNIDO's Energy and Climate Change Branch pursues the integration of low-carbon objectives into industrial development policies and activities, especially with respect to small- and medium-sized industries. In particular, UNIDO helps its clients solve two fundamental problems: (i) de-linking intensity of energy and material use from economic growth, and (ii) reducing the environmental damage that occurs with energy and material use. Within UNIDO, potential synergies with relevant programmes, such as the Environmental Management, Business, Investment and Technology, Trade Capacity-Building and Agri-Business Development, will be established

GEF council document GEF/C.31/5 states that UNIDO's overall comparative advantage is that it can involve the industrial / private sector in projects. This is also the case in the proposed project, where the focus will be on facilitating a low carbon development pathway for agro-industries in Albania. Critical factors for the success of the project are the implementation of the technical solutions which are tailored to the local needs of Albania's four sub-industrial sectors, and the creation of a vibrant local supply chain, so that equipment components are produced cost-effectively, system construction and costs are in keeping with the local economy, and operation and maintenance are timely and affordable. UNIDO's experience in working with the industrial sector in general and small and medium-sized enterprises in particular, is therefore critical for the achievement of the objectives set forth in this project. Furthermore, the document illustrates the comparative advantages of UNIDO services in sustainable energy and climate change as increasing productivity and competitiveness through the introduction of state-of-the-art renewable energy technologies; and reducing GHG emissions through capacity building.

UNIDO has widespread experience to interact with all levels of stakeholders from the private and public sector as well as CSOs. The proposed GEF project draws on this experience by strengthening the competitiveness of local industries and by introducing renewable energy technologies. UNIDO gives special attention to mainstream gender equality throughout its technical cooperation project portfolio, and with local productive activities in Albania mainly carried out by women, this is expected to prove a very important aspect of this project.

To ensure up-to-date know-how, UNIDO actively collaborates with a number of energy technology centers, networks and learning platforms worldwide, such as the International Centre for Science and High Technology in Trieste, the National Cleaner Production Centers (46 countries) and the Green Industry Platform to form strategic partnerships to promote knowledge management and best practices for technology transfer.

UNIDO is well-placed to implement this project with its global network of experts and experience from its relevant (GEF funded) project portfolio. More details on UNIDO's thematic expertise on bio-energy is provided in section A.7.

## **A.4. The baseline project and the problem that it seeks to address**

### **A.4.1 Background on bio-energy in Albania**

The industrial sector in Albania consumes a significant proportion of Albania's total energy consumption. In 2013 the sector consumed 15.6% of total final energy, the transport sector 39.5%, the residential sector 24.2%, the services sector 9.4% and the agriculture sector 11.3%. The food industry (including olive oil production and other fruit processing) contributes 40 to 45% to the GDP of the industrial sector, while paper and printing

(including wood processing) contribute 12 to 17% to the GDP of the industrial sector<sup>7</sup>. The largest consumer of energy in the industry sector are the food, beverage and tobacco sectors (18.76%), and biomass does not feature as a fuel in these industries. Over the past 10 years the lack of innovation in these industries has hampered their development. The cost and availability of energy is an increasing concern for industry due to rising costs of fossil fuels. Although relevant bio-energy conversion technologies are known and available worldwide and in neighbouring countries, their reach has so far not penetrated Albanian SME sectors. It is worth noting that Albania's GDP has for many years been dominated by its agriculture sector (up to 40% of the total GDP) and, although the specific weight of the agriculture sector to the total GDP has been reducing in recent years, the agriculture sector is still very important for the national economy and remains the main economic sector in rural areas. The main fuels are oil-derived products with a share of 29.55%, followed by electricity with 25.98% and fuel wood with a 10.89% share. Over 95% of electricity generation and 20-23% of total primary energy sources are provided by hydro. The country's reliance on hydropower makes it vulnerable to changes in hydrologic conditions, as witnessed during periods of drought in 2001-02, 2007-08, 2013-14 (which started as a dry year), and this has reduced the electricity security of supply<sup>8</sup>. In addition Albania has considerable imports of energy which vary – depending on yearly conditions - between 30 and 60% of total primary energy sources. Renewable energy in general and modern industrial biomass in particular (e.g. olive oil pomace – as by-product of olive oil industries) can be a solution for reducing this dependence on imports and can improve not only security of energy supply but also the country's economic and political macro security by decreasing the country's budget deficit. Finally, the development of renewable energy projects attracts foreign investment and can generate new jobs for Albania.

The demand forecast for energy sources for all industrial sub-sectors shows that the most important future energy commodities continue to be oil and its by-products; electricity; plus coal<sup>9</sup>. Fuel woods (traditional biomass) consumption for the baseline scenario is very low and the forecast shows that it will be reduced from 31 ktoe (2013) to 15 ktoe by the year 2025. Despite the potential, calculations show that that contribution of modern biomass (such as olive pomace, fruit seeds and saw mill dust and other “wastes biomasses” of wood processing; olive oil production; other fruits production and pulp and paper production) is almost zero and has not been included in the forecasts.

Biomass is a widely used energy resource in Albania – predominantly in the form of firewood including shrubs and agricultural residual plants. The consumption of firewood had been decreasing by a factor of three to four during the period 1990-2002. Since then fuel wood consumption has increased slightly in recent years as a result of the increased prices of other fuels and electricity. The available biomass waste from agriculture is typically not valorised and is usually destroyed on the spot. The use of biogas is underdeveloped despite the available resources. In addition the heating appliances used — stoves and fireplaces — are often obsolete and inefficient, with heat losses amounting to 40-60%, which could be addressed through replacement with state-of-the-art high efficiency boilers. Processed wood fuels — wood chips, pellets and briquettes — are not popular due to their higher prices and the underdeveloped supply system.

This project aims to increase the penetration of modern biomass technologies to support the goal of 180-200 ktoe by 2025. Albania's theoretical, technical and economic potentials for biomass for energy generation are estimated to be about 4.16 Mtoe, with biomass of fruit and olive waste & agricultural production biomass contributing up to 1.51 Mtoe of the theoretical potential and about 1.3 Mtoe to the economic potential (see Table 1). With the current level of overall primary energy resources consumption in Albania (2017 ktoe in 2012), the economic potential of biomass could satisfy about 60% of Albania's energy demand. Realisation of this potential would lead to a replacement of approximately 0.2 million tonnes of fuel equivalent (counting a penetration rate at 2020 of about 16-20% of total potential) per year of fossil fuel and decrease greenhouse gas (GHG) emissions by 0.3 million tCO<sub>2</sub> equivalent per year towards 2020. Biomass for energy purposes in Albania can be sourced from the following sources:

- Agricultural residues (stems, seeds etc.) after completion of their production cycle, which are not used in other production sectors;

<sup>7</sup> INSTAT 2013 – Yearly statistic of Albanian Enterprises

<sup>8</sup> In this respect, in-depth analysis was carried out under the First<sup>8</sup> & Second<sup>8</sup> (Third is under preparation) National Communications of Albania to United Nations Framework convention on Climate Change prepared with the support of GEF/UNDP related to climate change effect on electricity generation for HPP-s of Drini and Mati rivers' catchment areas. The World Bank organized a conference to analyze increased risk of bad hydrology as effect of climate change in Albania<sup>8</sup>. During the last six months of 2013 and initial months (January & February & March & April) of 2014, it was almost clear that power generation from hydro on ongoing months is much lower than average. Another difficulty is the continuing delay of hydro power plants equipment rehabilitation that results in the reduction of their energy availability.

<sup>9</sup> Based on the National Energy Strategy of 2003 and its draft update of 2009; the Second National Communication of 2009, the Albanian Energy Document for EU Integration (approved in March 2010) and the National Energy Efficiency Action Plan (approved in September 2011)

- Fire wood or wood residues from various wood processing industries;
- Energy plantations (short-rotation coppice) cultivated to be burned as biomass, and;
- Animal residues (bones, skins, dung), which are not used in other economic sectors;
- Wastes (e.g. food and household waste).

**Table 1: Theoretic, technical and economic potential of each category of biomass**

Biomass categories	Theoretical potential (ktoe)	Participation in the state energy balance (%)	Technical energy potential – heat (ktoe)	Participation in country's heat energy balance (%)	Technical energy potential – electricity (ktoe)	Theoretical Potential of possible participation in the state electricity balance (%)	Economically liable potential for the next decade, (ktoe)
Forests	263.6	1.07%	234.4	0.95%	70.3	1.07%	315.1
Biomass from seed fruit & agricultural production	1521.1	6.17%	1449.8	3.97%	293.9	4.45%	1316.8
Urban waste	1576.4	6.39%	1276	5.18%	382.8	5.80%	1446.6
Waste from orchards	168.1	0.68%	142.9	0.58%	42.9	0.65%	207.5
Waste from livestock	585.25	2.37%	521.6	2.12%	156.50	2.37%	701.5
Energy plants	62.34	0.25%	57.1	0.232%	17.13	0.260%	76.72
<b>TOTAL</b>	<b>4176</b>	<b>16.9%</b>	<b>3212</b>	<b>13.0%</b>	<b>963.6</b>	<b>14.6%</b>	<b>4064.2</b>

#### A.4.2 Background on olive oil production in Albania

Olive plant is one of the most ancient and most valuable plants of Albania: as a fruit - for its oil with high economic value, for the wood - for its decorative value and also for its environmental values - olive groves surround the major coast line cities of Albania. The following figures are based on databases of INSTAT and the Ministry of Agriculture and also based on data from the Albanian Association of Olive Oil Producers (AAOOP). There are about 44,500 ha of olive groves and over 5.294 million olive trees in Albania (2012 data). It is important to note that in last three years (2011, 2012, 2013) Albanian Government has provided a subsidy of up to 30% of all costs of planting olive trees resulting in an increase of up to 0.7 million trees in this period. The planted area will continue to increase during the next years since this agriculture policy is expected to continue for the next decade. The number of olive trees during the period 2000-2012 has increased with different growth rates, reaching a maximum of 9.04% in 2012.

The olive production during 2000, 2005, 2010 and 2012 (tonnes) and the analysis shows that olive production has increased in absolute terms from 26,000 tonnes to 52,000 tonnes. It must be noted that there are many losses as a result of non-collection of the olives. The losses are calculated to be 25-27% of the production of olive trees. During 2000-2012, about 20,000-30,000 tonnes of olive were used for oil production.

Table 2 figures can be used as a guide for expected yields and costs for a mature and fully irrigated Albanian olive grove sited correctly. For non-irrigated crops, the yield can be expected to be substantially lower, by up to 40-50%.

**Table 2: Average values to be expected yield for mature fully irrigated olive grove according to interviews carried out for 15 different olive farms**

Annual yield of fresh olives per tree	50 kg
Oil varieties % oil	20%
Weight of olive oil per tree	10 kg
Weight of one litre of olive oil	0.9 kg
Oil production per tree	11.11 liters'
Tree planting spacing	8m x 5m
Tree density	250 per hectare



Kg of fresh olives per hectare	12.5 tones
Litres of olive oil per hectare	2777.5 liters
Farm gate price for fresh olives	1 Euro per kg
Farm gate bulk price for olive oil	4 Euro per liters
Costs of growing & machine harvesting	3000 Euro per hectare per year
Capital outlay for planting (excluding land)	5000 Euro per hectare
Capital outlay for land	10000 Euro per hectare

Further details on olive oil production in Albania can be found in the Technical Annexes.

#### A.4.3 Olive oil production and the use of olive oil waste for energy production in major countries

The socio-economic importance of the olive sector is significant considering that in the EU there are more than 2,000,000 olive-growing farms and the production of olive oil in the EU represents 80% of world production and provides around 750,000 full-time jobs. Examples outside the EU include Turkey which now produces about 7-10% of the world production; through targeted government support the number of trees is increasing year by year. Worldwide olive production is variable and is subjected to a multitude of factors, of which the meteorological ones are the most important. Indeed, the majority of world plantations are to be found in un-irrigated land, so that the pattern of annual rainfall and, associated with the alternating phenomena of the species-specific characteristics, seriously affects determine the harvests. The number of these industries in the main producing countries is shown in Table 3.

**Table 3: Comparison of oil mills with average production in some main countries; Source study on “Pollution prevention in Olive Oil production” - Regional Activity Centre for Cleaner Production (RAC/CP), (Nov 2010)**

	N° of oil mills	Average production (t/year)
<b>Spain</b>	1,920	650,000
<b>Italy</b>	7,500	462,000
<b>Greece</b>	2,800	281,000
<b>Tunisia</b>	1,209	168,750
<b>Turkey</b>	1,141	75,000
<b>Albania</b>	198	52,000

In general four to ten kilos of olives are needed to produce just 1 litre of olive oil. The olive tree begins to produce olives between the ages of 5 to 10 years, reaching maturity at about 20 years. After 100 to 150 years, its production begins to decline. The age of the tree influences only the quantity produced, not the quality. The process from olive tree to oil is briefly described below with full details provided in the relevant Annex.

The harvesting can be done by hand hitting the tree with a flexible pole so that the olives fall into canvas covers placed on the ground or by means of mechanical vibrations. Some olive varieties may be picked in October when they are still green, while other varieties may be left until February when they are at the peak of ripeness and bursting with oil. Olives are usually pressed within 24 hours if the weather is hot. If the weather is cooler, the pressing may occur within 72 hours of harvesting.

Olive oil extraction is the process of separating the oil from the other fruit contents (vegetative extract liquid and solid material). The basic steps in making olive oil are always the same and include: 1) cleaning the olives and removing the stems, leaves, twigs and other debris; 2) crushing the olives into a paste; and 3) separating the oil from the rest of the olive components. At present, three major types of extraction system are used on the olives: the “traditional process”, the 3-phase process and the 2-phase process.

**Types of waste generated:** Olive mill technology generates a variety of wastes, both solid and liquid. The solid wastes generated in the olive oil extraction are *alperujo* [Spanish] (i.e. pomace from the two phase system), and *orujo* [Spanish] (i.e. pomace from the three phase system). Solid wastes are also generated in the olive groves during pruning of olive trees. This includes leaves and small branches (after pruning). Leaves can be used as animal feed, as fertilizer or in the production of compost, while small branches, pits and dried olive pomace can also be used for energy production. Liquid wastes are known as Olive Mill Waste Water (OMWW) and are used in some cases as additives for the manufacture of cosmetics and also for biogas since substantial amounts of unrecoverable oil and fine residues of pomace remain in the particles of OMWW.



The possible uses of pomace are: (i) production of bio-energy; (ii) production of a lower quality oil as a food product by means of a chemical process at facilities known as "olive pomace refineries"; (iii) spreading over agricultural fields as fertilizer (or mixing it with ground for backfill, for instance at quarries); (iv) use in animal feed; and (v) disposal/recovery as waste. For production of energy (the focus of this project) pomace can be burnt directly in boilers or converted to pellets or briquettes for use in boilers and stoves. In both cases the olive pomace must be dried first.

Rural areas present certain characteristics which favour the potential development of an olive pomace energy chain because: a) the agricultural sector is one of the most important economic activities in rural areas which faces significant difficulties. The unemployment rate is higher than the national average, especially among young people; b) additional economic activity is offered to the local community. The development of community based bio industries often results in strengthening the community support services, providing additional jobs in the local government and service sectors; c) Provides a green label to the energy user differentiating it from other competitors; and d) mitigates rural depopulation.

For example in **Greece** 40-45% of the olive pomace is used for energy and it is planned to reach 55% by 2020. Olive residues have been widely used in Greece in the past for space heating in the domestic sector (and it still remains an important fuel type for rural areas) and as fuel for process heat requirements in a large number of small-scale industries (i.e. olive mills, greenhouses, cotton ginning factories, sawmills, etc.). The main reasons for this high adoption rate in rural areas have been: a) inexpensive and huge source of energy; b) disposal method deriving from agricultural factories and sawmills and c) high cost of other sources of energy sources. Increasing oil prices, awareness of climate change and its adverse effects have recently brought biomass to the forefront along with the other renewable energy technologies.

In **Turkey** the use of pomace has been high for the last 10 years with about 55% of mills using olive oil pomace for meeting energy demand within the factory and the rest (about 60%) is dried and pelletised/briquetted and sold to residential, service and industrial market. In **Italy** 18-20% of the olive pomace in olive areas is used for energy purposes and it is planned to reach 30% by 2020. In order to further promote the utilization of olive pomace for energy purposes last year the Italian Government adopted a number of primary and secondary legislation to be in line with EU Directives and this will help to facilitate the management of olive mill pomace and to provide incentives for producing energy from biomass starting from this (by-) product. These include clarification in defining olive pomace as a by-product or as a waste product, introducing favourable laws for obtaining permits for producing energy from biomass (especially for small facilities) and easing the transportation regulations for some types of waste such as pomace.

There is real scope for Albania's olive oil industry to gain experience from the experiences in Greece, Turkey and Italy where significant proportions of the waste are used for energy. In addition Albania could replicate the use of waste in the Republic of Croatia, which has a clear action plan to develop such markets and resolve olive residues problem through: i) Increasing levels of knowledge and awareness about the need for olive producers using new energy technologies; ii) Making business plans how to mix olive pits, lots and wood residues; iii) Organizing markets for olive pomace residues; iv) Establishing new co financing positions for small investors; v) Defining tariff for selling electricity to national electrical system; vi) Encouraging potential investors to invest not only in energy but also in other kinds of olive residues by-products; and vii) Ensuring that olive residues becomes one of the basic biomass resources and is a priority when compared to other kinds of RE sources (wind, waves etc.).

#### A.4.4 Baseline scenario - potential for use of olive oil waste products for energy in Albania

The potential for olive oil waste products for energy in Albania has been calculated during the PPG phase, and the following figures show data regarding the olive oil sector, which is the main base for calculating olive pomace biomass. The data is provided by databases of the Ministry of Food and Agriculture and by the Association of the Production of Olive Oil. From 76 processing lines of olive oil in 2000 this had increased by the end of 2012 to 178 processing lines, of which about 120 lines are of continuous type and 58 lines are type with press machine. Details include: i) Lines of type PIERALISI (65 are this type of factory) accounting for the processing of about 68% of olive production; ii) The working time of processing season is now 70 days down from 100 days in the past. Even though in modest amounts, there has been a beginning of the production of BIO Virgin and Extra Virgin olive oil in Albania. USAID, FAO and Association of Organic Agriculture have given their support to increase the quality of olive oil.

Production of olive pomace biomass is completely dependent on the olives processed for olive oil production and olive pomace biomass has been calculated for years 2000, 2005, 2010 and 2012. Olive processed as

average for each olive oil factory for each zone and olive pomace produced as average for each olive oil factory for each zone (tonnes/year per factory).

The energy audits (see the Technical Annexes for a summary of the energy audits) carried out during the PPG in 15 olive oil enterprises show that 11 factories are using olive pomace as fuel for producing hot water for process needs and for securing some hot water demand for space heating and water heating (five of them are using diesel as fuel). However, almost all their boilers are more than 7-15 years old, of low efficiency and have not been sized correctly. Energy audits show that olive pomace is naturally dried and after that is used directly in the respective boiler. There are no driers, briquetters or pelletiser machines installed in any of the Albanian olive oil factories audited.

Depending on the industrial processing method solid (olive pomace) and liquid (wastewater) residues are being generated in different quantities as waste products from the olive oil production. While up to a decade ago pomace used to be a no-cost resource for olive millers and used to be sold to pomace oil refineries, today pomace oil has no market due to competition with other oils. Whereas the wastewater is rather difficult to recycle given it is combination of water and fat, the olive pomace is an efficient fuel and offers a valuable energy source whilst at the same time creating new revenues, increasing the quantity of renewable energy and improving the environment. The olive oil sector is being selected as the primary target sector due to its biomass potential, its need and potential for technological innovation in the field of energy conversion, and based on its economic importance as part of the food processing sector. The olive oil sector would be used as an example to initiate technological innovation, which could then be replicated in the related sectors such as fruit- and other agro-processing sectors with significant biomass potential.

There is clear potential to upgrade the equipment in the olive oil factories to include efficient biomass boilers, driers, briquetters and pellet machines. It is proposed that the olive pomace will be firstly dried, then part of the pomace (only 6-12% on average based on the analysis of energy audit) will be burned directly in the new efficient biomass boiler; and the remaining part (88-94%) will be used for producing briquettes or pellets and will be sold in the market. Where small mills are located close together they will be stimulated to co-operate to achieve economies of scale (e.g. through investing in larger equipment and a stronger price negotiating position with consumers with large demand). Factories are concentrated in the eight regions in the country and they are between 10 and 80 kilometers apart. The road network is sufficiently developed to enable cooperation.

The potential demand for dried olive pomace, pellets and briquettes is significant; coming from industry, the service sector and public buildings as well as the residential sector. Dried pomace and briquettes can be used directly by industry for heat and steam generation whilst public buildings (e.g. schools, kindergarten, commune buildings) can use either briquettes or pellets for their heat and hot water provision. The residential sector uses pellets in stoves and small boilers. There is already a market for pellets and briquettes and as part of the Alterenergy project 10 pellet boilers are being installed in Albanian schools. Several universities and hospitals are also looking to convert to biomass boilers.

As mentioned there are around 178 olive oil factories, registered as member of AAOOP; based on AAOOP's data there are about 20 others factories, which are not yet an associated member in Albania. If they would all meet their own demand for thermal energy, using olive pomace, they would save 2.35 million litres diesel/year (equivalent to 3 million euro/year), and if they used their excess olive residues to supply other industries/businesses/ households, an additional 9.85 million litre diesel/year (equivalent to 12.31 million euro/year) could be saved (e.g. equivalent of heating almost for 360-400 elementary schools).

It is widely expected that there is demand for the olive oil pomace, either from the sector itself, either from the industrial, tertiary or domestic sectors. The AAOOP will act as a key partner for the involvement of the olive oil sector, to disseminate information and results, and will act as a long-term national partner to anchor national capacity and ensure sustainability of the project activities. Utilisation of olive oil pomace will help Albanian economy to substitute a minimum of 12.2 million l liter of diesel, or the whole olive oil industry will profit an equivalent value of 15,25 million euro per year. The main national benefits are expected to be:

- Reduced greenhouse gas emissions
- Reduced costs for enterprises through meeting heat energy demand for industrial processes, space heating demand and for the preparation of hot water within olive oil industries and utilization of olive pomace sufficient for selling it to open market to meet residential, private and public buildings space heating demand
- Economic costs savings at the national level and reduced dependency and expenditures on imported energy

- Reduced load on the power system reducing the imbalance between the supply and demand especially during the peak periods
- Enhanced employment opportunities and development of the country's SME sector in the utilization of olive (and others) pomace biomass for energy purposes, and
- Enhanced product quality.

#### A.4.5 Baseline project

There are a number of on-going and planned initiatives in Albania which support either renewable energy or the agro-food sector. These form the baseline project and are detailed below. Since there are no initiatives that are targeted specifically at the use of organic biomass waste for energy in the SME agro-processing sector, this project aims to build upon these on-going initiatives to address this gap.

##### A.4.5.1 Renewable energy policy framework

Support for renewable energy sector in general and biomass in particular is set out in the new Renewable Energy Law (RES Law), passed in May 2013, which is in line with provisions of the EU's RES Directive. The law aims to boost RE development in all economic sectors including industrial sectors, and attract foreign investment in the RES sector. The RES Law also includes: i) the legislative framework for the promotion of electricity generated from renewable energy sources; ii) setting of the mandatory national targets for the overall share of energy from renewable sources in gross final consumption of energy; setting the priority connection and access to the grid systems of electricity generated by installations using renewable energy sources; iii) defining the priority for the purchase and payment for such electricity by the renewable energy off-taker; iv) defining the secondary legal basis for streamlining authorization, licensing and permission requirements for RES plants; v) defining the rules relating to Guarantees of Origin, streamlining licensing and permission requirements.

A draft National RE Action Plan (NREAP) has also been prepared (based on the request of RES Law) by the Ministry of Energy and Industry (MEI). Based on the Article 17 of RES Law, the Council of Ministers shall introduce measures effectively designed to ensure that the share of energy from renewable sources equals or exceeds targets set in the NREAP. The RES target for 2020 for Albania is 38% (from 29% in the base year 2009) of total primary energy supply. RES contribution in 2013 was approximately 29.5% demonstrating that little has been done to date.

Actual financial support to RES producers is limited to power (electricity) and is provided through two schemes: i) Feed-in tariff for small power producers; and ii) Tax exemption. Since 2007 the feed-in tariff is applied only for small hydropower producers (HPPs) and not for any other renewable energy source. Tax exemptions are provided for by the law no. 8987, date 24.12.2002 "On creation of facilities for construction of new power capacity" and the related Council of Ministers' decree no.839, date 5.12.2007 "On establishing of conditions and procedures for reimbursement of excise tax and creation of facilities for construction of new power capacity" as amended. The law stipulated the exemption of machineries and equipments used for construction of new power capacities using renewable energy from the custom duties and exemption from the excise tax for the fuel used by such power producers. These tax exemptions are applied for all RES power producers irrespective of the installed capacity and for other power producers with installed capacity higher than 5 MW.

According to two World Bank reports<sup>10</sup>, Albania has made good progress in developing a more friendly general business environment for energy projects, e.g. in terms of starting new businesses and to obtain a construction permit, and specifically on RE project development, the licensing process has been improved, even though a number of difficulties or uncertainties in some phases still exist. The establishment of a one-stop office for licences in 2009 has been an important step forward, but its functioning could still be improved. The new law on renewables requires that relevant information be made available by MEI and NANR. As to the information on supporting measures for using renewables for electricity, the Government has made this information available to investors not only through the legislation published on the official journal or different websites, but also through a number of public events such as conferences, seminars or workshops. The Government plans to transform the agency responsible for renewables and the local energy offices into information centers for all interested parties regarding the supporting measures for usage of renewables.

<sup>10</sup> World Bank Report, 2012 "Doing Business in Albania"

There is a real need to develop the secondary legislation under the RES Law that will put in place the specific incentives for biomass heat. For example under the baseline project there are no targets for renewable energy based heat; nor are there any clear incentives or regulations which would encourage the uptake of biomass technologies in industries and for space and hot water demand.

#### *A.4.5.2 Renewable and rural area support initiatives*

The ongoing ALTERENERGY Strategic Project (financed from IPA and Albanian Ministry of Energy and Industry) aims to provide a significant contribution to the objective of achieving a higher level of sustainability with regards to energy production and usage in the Adriatic area. The specific objective of ALTERENERGY is to develop replicable models for the sustainable management of energy resources in small Adriatic communities, improving their capacity to plan and manage integrated actions dealing with energy saving and energy production from renewable sources. In order to accomplish its objectives and produce the expected results, the project will implement a limited number of pilot projects (introducing EE/RES measures such as thermal insulation, efficient windows, efficient lighting and solar hot water systems). In particular the pilot projects will include the installation of biomass efficient heating systems (some to be based on olive oil pomace) for 5 schools in Lezha region and 5 in Lushnja region, selected by the MEI in order to maximize their potential impact as reference models for the whole Adriatic area and beyond.

*With the exception of ALTERENERGY, the baseline project provides support to renewable energy based electricity generation or transport rather than heat generation, despite the potential for use of biomass waste from the food and agro processing industries to be used for export and on-site heat. ALTERENERGY will install a number of olive pomace based boilers but does not include for any initiatives to support the provision of suitable feedstock.*

As a potential EU candidate country, Albania must comply with the legislation and adoption of EU standards. The process for implementation and management of the Community's Common Agriculture Policy demands the implementation and enforcement of a new institution, the Paying Agency, known in Albania as the Agriculture and Rural Development Agency (ARDA). The basic functions of ARDA are related to the implementation of national policy and measures in the agro and food sector and in rural development; implementation of measures of the pre-accession program, and preparation for the implementation of the measures according to Common Agriculture Policy (CAP).

ARDA was established in January 2009. The principal aim of ARDA is to promote Albanian government financial support to the rural sector with direct payment to farmers. In recent years, ARDA has increased financial support to farms, agricultural and agro-industrial enterprises with an emphasis on fruit trees, vineyards, vegetables and animal farming, as well as on the industrial processing of fruit, grapes, vegetables, milk and meat. More than 25,000 eligible applicants have received financial support of 40 Million USD. The principal criteria for financial support from ARDA are: i) efficiency of the proposed project; and ii) promotion of collaboration between beneficiaries in order to develop access to markets and sustainable investments. This financial support to farmers has stimulated the application of new technology in agro-manufacturing, the cultivation of vegetables in greenhouses and livestock breeding.

*However, until now there has been no support from ARDA related to promotion of industrial biomass technologies in general and olive oil biomass in particular. This project is expected to work with ARDA in this direction and combined efforts will be required to get the maximum benefits.*

#### *A.4.5.3 Baseline data on current energy use and practices of disposal of olive oil waste in Albania (based on PPG findings)*

The baseline data for the project were collected through the energy audits of olive oil production factories carried out as part of the PPG; these data will serve as the baseline from which progress will be monitored and evaluated. A detailed questionnaire was prepared before carrying out 15 energy audits all over Albania. The sites' processing capacity was between 0.8-3 tonnes of olive processed/hour and was representative for all the factories in Albania. The first step of the energy audit process was a site visit, which took place during two days for each factory (including familiarization with the production process, analysis of energy consumption in each factory, completion of the questionnaire and identifying preliminary energy measures and most appropriate technologies to be introduced in the olive sector).

The second step was to analyse the technological process and to closely check all energy systems and to gain a better understanding of their actual technical parameters, especially related to their operational efficiency. Energy demand of the factory comprises (i) electricity, (ii) Olive Oil Biomass/Pomace (in some cases), (iii)

diesel (for transport and heat in some cases) and in rare cases also (iv) LPG (for heat). Electricity is needed for running all production lines, lighting and AC part of administration building. In some cases olive pomace is used as fuel in the boiler for process heat and for production of hot water. Diesel is used in vehicles and in some cases also for securing heat for technological processing and for space heating of their facilities (five out of 15 factories audited). A small part of diesel is also occasionally used as fuel for diesel generators (in case of interruption of grid electricity supply).

Data related to monthly electricity consumption for every month has been gathered and it is important to point out that this cost will increase in coming years, since current electricity prices in Albania are below cost of generation, transmission and distribution. The installed power capacity for all 15 factories audited varies from 54 kW<sub>e</sub> (for small factories with capacity 0.8-1 ton/hour) up to 120 kW<sub>e</sub> (for large factories with capacity 2.5-3 ton/hour). Main electricity consumption is to feed the three main lines of production. Besides production facilities, other larger electricity consumers are pumps and fans.

Lighting in most cases (9 out of 15) is provided with 100 W incandescent bulbs, so it a significant load, particularly since there is no natural lighting in some of the production units (lighting is provided 24 hours a day, in all shifts). Better management of lighting, and upgrading of lighting, has already been identified as a measure to improve energy efficiency.

The power factor in the factories is not known and it is suggested in the future to measure it. If lower than 92% (and it is likely that it is since the factories are working with reduced load factor (25-45%)) then based on the respective electricity supply regulation they should include in their supply point a battery of capacitors to improve power factor.

Heat for technological processes and for heating the factories' workshops is generated via boilers. Olive pomace is used as fuel in 11 factories out of 15 visited and the installed boiler capacity has not been selected properly – all of them are over dimensioned (with higher capacity than is needed). All of them have been bought second hand and have been bought without economizers (to reduce the price, but with very low efficiency). Over dimensioned and without an economizer, the hot exhaust gas of the burner exits the stack with very high temperature and the heat contained in it cannot be used for the process. This wasted heat reduces the efficiency of boiler down to 40-60% since part of the fuel's energy is released to the atmosphere. This is compared to a state of the art boiler with efficiency of 85-92%. Analysis of all energy audits carried out shows that own olive biomass consumption within the factory is only 8-16% of total pomace produced. By installing a new efficient boiler (with efficiency of 85-92%) a significant amount of olive pomace at the level of 30-50% of the actual olive pomace used in inefficient boilers could be recover/reduced and used as raw material for producing more briquettes or pellets (and so more will be sold in the outside market, which will bring more income). The rest of the olive pomace is used as fertiliser (approximately about 30% based on the energy surveys carried out) and 54-62% is dumped on water streams or open land. This process has quite a large environmental impact due to the production of highly polluted wastewater and/or solid residue.

#### **A.4.6 The problem that the project seeks to address – key barriers to the use of olive oil waste streams for energy**

The on-going practices of the olive oil industry (and other sectors including wood processing, wine production, jam-fruit production) are not sustainable with respect to energy use and consumption or waste disposal. The factories rely on inefficient over-sized second-hand boilers for their heat energy requirements. Many rely on fossil fuels while some do use their waste (pomace) in inefficient boilers. The high cost of fossil fuels and the fluctuating and volatile oil market create a significant burden on the industry. In addition the reliance on fossil fuels for heat results in relatively high greenhouse gas emissions. Waste disposal has a significant environmental impact as the waste is dumped in water streams and on open land (as estimated to be the case for 54-62% of the olive pomace). At the same time other industries, the public and residential sector continue to rely on electricity and fossil fuels for their heat and hot water demand with the associated GHG emissions.

Detailed consultations with enterprises, finance institutions and policy makers have shown that without a transformational initiative this situation is likely to continue. When the benefits of biomass technologies are being presented the stakeholders are interested in investing. However there is no experience in Albania with efficient olive pomace boilers or with pellet or briquette machines. Factory owners are unaware of the opportunities; the finance institutions do not have experience of the technologies and therefore do not understand the risks and opportunities and so would not lend to potential projects. As detailed above, despite the vast potential and opportunities, there are currently no tailored initiatives focusing specifically on the use of olive oil waste for energy.

This whole set of barriers will be addressed through the project components with, at its core, the technology demonstration, plus the support of the enabling environment to ultimately achieve a sustainable market transformation. Table 4 summarises the main barriers to its uptake which the project will aim to tackle, as well as recommended actions.



**Table 4: Main barriers to its uptake which the project will aim to tackle and recommended action**

Non-Economic Barriers	Detail (from the feedback from stakeholders)	Recommended mitigation actions
<b>Capacity and awareness barriers</b>		
<ul style="list-style-type: none"><li>No examples of modern biomass energy use in Albanian olive oil industry</li><li>No public information on available technologies</li><li>Lack of awareness and understanding of benefits within industry</li></ul>	This is one of the most important barriers related to penetration of state-of-the-art technologies for olive waste conversion in Albania. During the energy audits carried out under the PPG, more than 50% indicated they had not made a positive decision yet, because of the lack of information and > 90% said they would like to have much more information for final judgement. In addition over 80% of the end users participating in the consultative workshop indicated that they have had no information about industrial bio-energy technologies to help make their decision	Tailored capacity building and awareness raising among all owners for the financial benefits (being together) in close cooperation with sector federations and target companies
<b>Financial Barriers</b>		
<ul style="list-style-type: none"><li>Absence of appropriate financing instruments</li></ul>	RES Law has been approved in May 2013 and draft EE Law is in the final phase of approval. Neither include a RES/EE Fund and this is a significant barrier as has been pointed out in the consultancy workshop	Banks are ready for financing RES/EE projects (including financing of the technologies which are using olive pomace) and the technical assistance for developers to access available project financing (e.g. through the development of business plans, feasibility studies) Develop an investor guidebook for developers and investors to reduce the time of project approval
<ul style="list-style-type: none"><li>Lack of experience among financiers and perceived risk of financial institutions</li><li>Relatively high system costs and low payback on investment</li><li>Low priority investment</li></ul>	Consultation workshop discussion shows clearly that owners and loan officers have a lack of knowledge about different olive pomace energy technologies	
<b>Technical Barriers</b>		
<ul style="list-style-type: none"><li>Lack of understanding of benefits of using modern biomass technologies</li><li>No technology and process innovation due to the typical small size of companies, often family based and a conservative attitude</li></ul>	Consultant workshop presented a very important fact: most of the olive pomace boilers very low efficiencies, are over dimensioned (meaning low efficiency) and most of the factories have very low load factor. Utilisation of pelletisers may require establishment of cooperatives between 3-5 factories to have feasible investment	Demonstrate the use of modern biomass in olive oil industry which offers good opportunities for using biomass for energy production by selecting (boilers, driers, pelletisers, briquetters) based on detailed feasibility study
<ul style="list-style-type: none"><li>Lack of technical and environmental standards</li></ul>	There are no environmental standards for waste emissions from olive oil factories. This creates a barrier for investors, since they are not confident about appropriate technologies to meet environmental EU standards, and technical standards for biomass technologies	Standards should be adopted based on international practices, especially using Italian and Greek experience
<b>Policy and Regulatory Barriers</b>		
<ul style="list-style-type: none"><li>Lack of incentives for technologies</li><li>No specific policy targeted at the technologies or sector</li><li>Limited and inconsistent information at public institutions</li></ul>	Existing support initiatives focus on renewable energy electricity or on increased tree planting but there is no specific incentives or policy targeted at biomass technologies for heat in the agro/food processing sectors.	Develop specific targets for heat produced by industrial bio-energy technologies; clarify building codes and laws on installation of bio-energy technologies, develop incentives and tax exemption for relevant technologies
<b>Market Development Barriers</b>		
<ul style="list-style-type: none"><li>Lack of modern biomass supply chain</li></ul>	There are no suppliers related to state of the art technologies for olive pomace boilers, driers, pelletisers, briquetters in Albania. Almost all olive production lines are ordered from Italy.	Comprehensive biomass resource assessment to be made publicly available, focusing on olive oil production to encourage suppliers



## **A. 5. Incremental /Additional cost reasoning:**

### **A.5.1 Proposed additional GEF activities**

As described in the baseline project, a number of initiatives are underway to gear the energy sector in Albania towards more competitiveness and an increased uptake of renewable energy (RE) technologies and energy efficiency (EE) measures. Nevertheless, it is most unlikely that the industrial sector, and especially SMEs which characterise the olive oil sector, will take part in this transformation, given a number of specific barriers and characteristics which hamper a straightforward uptake by the sector.

The project seeks to address most of these existing barriers to a wide scale adoption of industrial biomass waste for energy in Albania, through an integrated and catalytic approach that combines interventions aimed at creating a market environment conducive to investment and demonstration projects. The main objective of the GEF project will therefore be to demonstrate the energy generation from olive residues through modern RE technologies and trigger a transformational effect throughout the olive oil and other sectors. Based on the experience gained through the demonstration projects, and supported by tailored capacity building in the target sectors, involvement of the financial sector and a detailed understanding of the economic potential of the sub-industrial sectors, the project will contribute to the creation of a business environment enabling private sector investment. The project will involve the key public and private players, and disseminate the results towards a larger audience in relevant industrial sectors (e.g. wood processing, wine production, jam-fruit production and other industries which have already presented their interest by signing letter of intent).

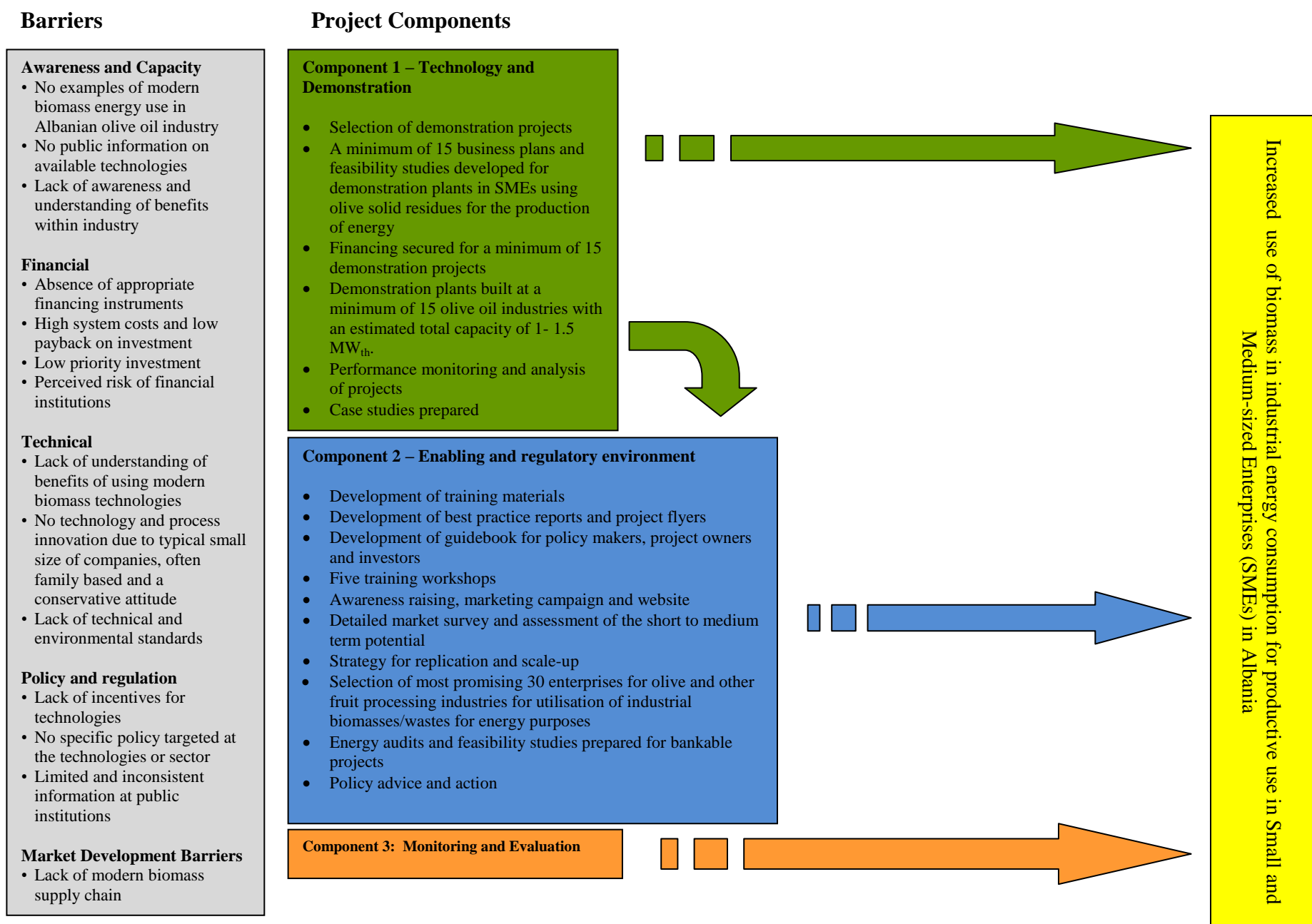
The selected project strategy will build on two favourable factors namely; the high commitment by the government to the development of modern biomass energy, and significant interest by the private sector to invest in more efficient technologies.

The project consists of two technical components, as below, plus monitoring and evaluation and project management:

- **Project Component 1 (PC1)** will demonstrate the technical feasibility and commercial viability of modern biomass technologies in the olive production sector in Albania. These will create best practice examples for the country for further dissemination and to help raise awareness.
- **Project component 2 (PC2)** will develop the market environment for biomass technology in industry in Albania through: enhancing awareness and strengthening capacities for key actors in the policy and industrial sectors (in the olive oil and other sectors with high replication potential such as wood processing, wine production, jam-fruit production), as well as supporting tailored policy actions and scale-up activities including the preparation of a detailed assessment of the biomass potential for industrial uses and the development of a pipeline of projects for replication.
- **Project Component 3 (PC3)** will focus on the monitoring and evaluation of the project

The figure below shows how the project components interact together in facilitating a transformational effect to the uptake of modern biomass in the industrial sector in Albania. The following section provides more details of each of the project components. Further background information on the projects components is available in the Annexes.

**Figure 8: Proposed project components, their interaction and the barriers they address**



**COMPONENT 1: Technology demonstrated for use of modern biomass technologies in industrial processes in Albania**

This component will stimulate technology and process innovation through demonstration projects in the olive production sector. Indicatively 10% of the enterprises will be targeted, i.e. a minimum of 15 out of the approximately 178 enterprises member of Olive Oil Production Associations currently active in the olive oil industry. The representative enterprises will be supported to prepare feasibility studies and related bankable business plans, provided with a grant and assisted in accessing finance and the technology will be demonstrated at the olive industries.

The proposed activities have been designed to ensure that the preparation, implementation and operation of these projects will build up the capacity of the stakeholder groups to ensure replication. Specifically it is anticipated that ARDA will have the long term national ownership for such projects. ARDA will be responsible for the management and disbursement of the grants and as such will receive targeted capacity building on the biomass technologies. ARDA already works with the target industrial sectors on other investments and technologies so is in a good position to extend their support to modern bio-energy technologies. ARDA would be interested in continuing this support beyond this project if appropriate funding could be found. Other stakeholders who will be integrally involved in this Component include the MoE, NANR and AAOOP. It is expected that the project experiences and lessons learned will be integrated in NANR's future policies; AAOOP's experiences will help to inform its members of the opportunities available and will allow it to promote co-operation between factories. Finally further sustainability and replication is ensured through the interaction with the financial institutions. Discussions on securing finance and the banks' experience of extending loans to this sector in the demonstration projects, will help to reduce perceived risk and encourage future lending, including to other agro-food sectors.

Details of the component outputs and activities are described below.

Outcome 1.1: Increased utilization of industrial biomass waste for energy purposes through technological innovation to trigger transformation of the olive oil industry	
Outputs	Activities
1.1.1 A minimum of 15 business plans and feasibility studies developed for demonstration plants in SMEs using olive solid residues for the production of energy	1.1.1.1 Selection of demonstration enterprises a) Verification of eligibility criteria for selection of demonstration enterprises b) Generating expressions of interest from potential beneficiaries c) Selection of eligible enterprises 1.1.1.2 Preparation of guidelines for detailed business plans and feasibility studies 1.1.1.3 Development of a minimum of 15 detailed feasibility studies and business plans on the use of olive solid residues for energy
1.1.2 Financing secured for indicatively a minimum of 15 demonstration plants	1.1.2.1 Development of guidelines for GEF grant allocation 1.1.2.2 Allocation of grant assistance to enterprises 1.1.2.3 Assistance provided to enterprises in securing finance for the demonstration projects.
1.1.3 Demonstration plants built at a minimum of 15 olive oil industries with an estimated total capacity of at least 1-1.5 MW <sub>th</sub>	1.1.3.1 Installation and commissioning of demonstration projects 1.1.3.2 Performance Monitoring and analysis of installed projects; documentation of results of demonstration projects and preparation of case studies.

Analysis carried out during the PPG highlighted the potential for innovation through modern biomass technologies, and the results suggest that relatively small size investments can trigger the uptake of these technologies. The feasibility studies carried out showed the financial profitability and technical feasibility of the application of olive oil biomass boilers, driers, pelletisers and briquetters to use the olive pomace internally in the olive oil factory to provide heat and hot water and the use of any surplus could be considered to cover nearby heat or hot water demand (for instance in a nearby residential, commercial or school or other heat demand buildings). These target technologies are described in detail in the technical annexes.

The cost effectiveness proved promising with relatively limited investment cost and payback periods as low as 3-5 years. These figures will need to be confirmed through additional analysis of other potential project sites and their techno-economic parameters based on the actual quotations for each technology and being aware of selecting expensive (high efficient) or cheap (low efficient) technologies. Further assessment will also be undertaken where a number of olive oil factories could co-operate to achieve economies of scale when purchasing and operating dryers and pelletisers or briquetters. This detailed analysis in the financial feasibility

will include biomass technology sized appropriately for the respective SMEs, or group of SMEs, in the olive sector.

**Output 1.1.1: A minimum of 15 business plans and feasibility studies developed for demonstration plants in SMEs using olive solid residues for the production of energy.**

**1.1.1.1 Selection of demonstration enterprises**

**1.1.1.1a) Verification of eligibility criteria for selection of demonstration enterprises**

At the start of the project, specific criteria will be verified relating to the technical, financial, legal and environmental aspects for each from the above mentioned industrial-biomass technologies. An overview of the draft eligibility criteria is included below:

- Level of innovation (in integration, technology, type of business model and geography)
- Level of co-operation (between a number of factories)
- Emission reduction potential
- General creditworthiness criteria used by different banks
- Replication potential
- Technical feasibility
- Willingness from the project owner to co-finance; as well as
- Specific financial indicators as part of the loan evaluation.

These will be further developed in consultation with banks to ensure that the projects will also meet the credit criteria used by different banks for these investment categories. In addition to the criteria a scoring system will be finalised so that if there is greater demand than from the minimum of 15 enterprises they can be evaluated against the scores. A minimum of 15 enterprises with the highest scores will be selected for technical assistance and for a potential equipment grant.

**1.1.1.1b) Generating expressions of interest from potential beneficiaries**

Expressions of interest (EoI) will be requested from industries interested in hosting a demonstration project and which meet the eligibility criteria. This will be done through the national press as well as at a workshop with the Olive Oil Producing Industrial associations. This workshop will focus on disseminating information about olive residue biomass applications, their benefits, incentives offered and opportunities for industries. The beneficiaries of the PPG studies are expected to form some of the first demonstration projects. These industries will be approached directly and invited to submit an EoI. Only those that have short paybacks are likely to be interested to take their projects forward. The EoI document will be uploaded on the MoE, ARDA and project websites and would also be advertised in newspapers and reputed magazines.

**1.1.1.1c) Selection of eligible enterprises**

The EoIs will be assessed and scored against the selection criteria. If the project is successful at this stage then the enterprise will enter into discussions regarding technical assistance for the preparation of feasibility studies, bankable plans and the possible GEF-UNIDO subsidy.

**1.1.1.2 Preparation of guidelines for detailed business plans and feasibility studies**

A tailored guideline document for detailed technical and financial feasibility studies for using olive & others solid residues for the production of energy will be finalised to ensure that the future studies all follow the same process. This will take the form of a template and practical guides containing the minimum information and analysis that is expected. This will ensure that the resulting plans submitted for analysis to the banks for financing are comparable and meet with the requirements of the banks. This work will be carried out by a national technical expert in consultation with banks. Options to be investigated in the feasibility studies will depend on the current status of the existing equipment but will include efficient biomass boilers, olive pomace driers, equipment for the production of briquets and, pellets and olive pit extractors. To ensure replicability these guidelines will be available to all interested agro-processing owners on the government and project websites.

**1.1.1.3 Development of a minimum of 15 detailed feasibility studies and business plans on the use of olive solid residues for energy**

Using the guidelines developed in the previous activity, detailed business plans with the best solutions tailored for the respective needs/condition of each enterprise for using olive & others solid residues for the production

of energy, will be developed for the selected olive oil enterprises. These bankable plans will be based on technical and financial feasibility studies carried out at the enterprise by a national expert with cooperation from the enterprise.

## **Output 1.1.2: Financing secured for a minimum of 15 demonstration plants**

### **1.1.2.1 Development of guidelines for GEF grant allocation**

A minimum of 15 olive oil enterprises will receive grants for demonstration plants for energy valorisation (meeting heat energy demand) using modern olive pomace with an estimated total capacity of 1.2 MW<sub>th</sub>. Due diligence guidelines on the selected technologies and projects will serve as a practical tool for the PMU, ARDA and other stakeholders and financial institutions (FIs) to check and mitigate the risk of the project grant and other investments and ensure successful implementation of selected projects. It is anticipated that there will be a Technical Group (TG) established that will be responsible for following the guidelines and making recommendations on GEF grants to the Project Steering Committee. The TG will comprise, as a minimum, of the National Project Manager, an NANR technical focal point, ARDA, and the Ministry of Environment. Currently there are no guidelines to help FIs or for grant allocation.

The proposed guidelines are intended to provide practical, standardised procedures for identifying the viability of potential projects and determining the optimal project specific parameters including GHG reductions associated with investments in biomass technologies. The guidelines will include guidance on the technical, financial and operational aspects of potential projects. This work will be carried out by one national technical consultant and one financial expert, with support from PMU and ARDA. The guidelines will cover all the technologies to be supported by this project. Indicatively support is likely to be for **15 efficient olive pomace boilers; 12 modern olive pomace driers; up to 7 briquetting machines; up to 10 pelletiser machines; and 6 crushed olive pit extractors**. Details of these technologies are provided in Box 1 in the Technical Annexes. Based on the energy audits carried out these could be broken down by enterprise as shown in Table 2 in the Technical Annexes. Note that the values presented are indicative, based on the PPG activities, and final figures will depend on a number of factors: final decision of enterprises what machines to be selected, which technology to invest (cheap or expensive one), what will be the proper technical capacity, what will be equity contribution; all of which will form part of the detailed feasibility study and business plan that will be prepared. Detailed feasibility studies may also examine the possibility of co-operation between olive oil factories to allow for more cost-effective larger equipment to be installed.

### **1.1.2.2 Allocation of grant assistance to enterprises**

Based on the guidelines developed in the previous activity each of the identified projects will receive a grant towards the cost of the new equipment. The level of subsidy will depend on the technology, the application and the financial returns or viability gap of the project, without the GEF-UNIDO support. This is expected to be between 15-25% of the equipment costs with the final amount being agreed by the Steering Committee (based on the above guidelines). The indicative total grant fund of USD 375,000 will be disbursed to the enterprises through ARDA.

### **1.1.2.3 Assistance provided to enterprises in securing finance for the demonstration projects**

Each of a minimum of 15 companies will be assisted in reaching financial closure by presenting their bankable plans to the three banks which, during the PPG have signed the letter of intents, and are ready to finance such projects if companies prove to be creditworthy. At the same time the intention to provide a grant, and its size, will be made clear to the bank. The existence of the grant will reduce the loan size and payback period significantly. To date 23 olive oil companies have signed letters of intent and show that they are committed to invest 10,000-20,000 USD as equity contribution with the rest of the investment to be financed by banks as loan. The final financing agreement will be solely between the bank and the enterprise.

## **Output 1.1.3: Demonstration plants built at a minimum of 15 olive oil industries with an estimated capacity of 1-1.5 MW<sub>th</sub>**

### **1.1.3.1 Installation and commissioning of demonstration projects**

Following the loan agreements and agreement on subsidies for the projects, the installation and commissioning will be undertaken by the technology supplier and the beneficiary industry as detailed in the feasibility studies. The National Project Manager and ARDA will be responsible for over-seeing each of the demonstration projects. Regular reporting on the progress of each project will be required. Following the commissioning of the project the enterprise will submit a completion report to the Project Management Unit (PMU). A template

for the Completion Report will be provided to the enterprise and will include details of the installation, photos and also at least one month's performance data for the system. Representatives for the PMU and regional representatives of ARDA may also wish to visit the demonstration projects to verify the reports. On receipt of this Completion Report 100% of the GEF contribution will be released to the project owner by ARDA (or a similar organisation).

### **1.1.3.2 Performance monitoring and analysis of installed projects; documentation of results of demonstration projects and preparation of case studies**

The evaluation of the demonstration projects will be carried out based on the baseline data as collected during the PPG phase and provided as part of the full feasibility studies. Each project evaluation will follow the same reporting structure developed and established for this project and in line with similar GEF projects. The indicators against which the project will be monitored will also be finalised. This will include as a minimum: monitoring and verifying the kW installed, energy generated and GHG emissions avoided directly due to the GEF project; assessing the operational record of the projects, assessing the commercial operation of the project; identifying any problems; compiling lessons learnt, assessing the socio-economic benefits of the projects to the target beneficiaries; and recommendations from lessons learned and implication/strategy for scaling up or replication.

For each project a case study will be prepared for dissemination purposes. The case studies should be designed in such a way that they are easily accessible by different stakeholder groups. These will also be included on the project website established as part of the project management activities.

## **COMPONENT 2: The development of the enabling market and regulatory environment for biomass technology in industry in Albania**

All stakeholders consulted during the PPG mentioned the importance of the enabling market environment through supporting the creation of a modern biomass supply chain and appropriate technological and environmental standards. Therefore this component aims to enhance awareness and strengthen capacities on the application of modern biomass technologies for key actors in the policy and industrial sectors in the olive oil and other sectors with high replication potential (e.g. wood processing, wine production, jam-fruit production) as well as supporting tailored policy actions and scale-up activities including the preparation of a detailed assessment of the biomass potential for industrial uses and the development of a pipeline of projects for replication.

This component's activities are split into four key areas all of which will ensure that a long-term market for biomass technologies is developed in Albania. The training will include train-the-trainers sessions ensuring that staff in the key sector associations, at ARDA, NANR and the Ministries are in a position to pass on their knowledge beyond the end of the project. In particular the associations will help ensure replication through their members and can play a role in identifying possible clusters of factories that could work together. This will include work in helping with the market surveys and in encouraging factory owners to become replication projects through the demonstration of the benefits. NANR will have clear ownership of the policy initiatives in developing the secondary legislation needed to support the market.

Outcome 2.1: Strengthened capacities on the application of modern biomass technologies for key actors in the policy and industrial sectors in the olive oil and other sectors with high replication potential	
Outputs	Activities
2.1.1 200 policy-makers, industry representatives and investors made aware and trained to understand the benefits of modern biomass and new technologies, through 5 training workshops, dissemination of best practices and guidebooks for policy makers, project developers and investors on the procedures and development process of an industrial biomass project	2.1.1.1 Development of national capacity in agencies and associations 2.1.1.2 Development of best practice reports and project flyers on demonstration projects 2.1.1.3 Development of guidebook for policy makers, project owners and investors 2.1.1.4 Five training workshops 2.1.1.5 Awareness raising, marketing campaign and development of technology website to be hosted by ARDA
Outcome 2.2: Detailed assessment of the biomass potential for industrial uses and the way forward for replication developed	
Outputs	Activities
2.2.1 Short- and medium-term potential	2.2.1.1 Detailed market survey and assessment of the short- and medium-term



for modern biomass applications for industrial uses assessed, and the way forward for replication across sectors developed	potential 2.2.1.2 Strategy for replication and scale-up
<b>Outcome 2.3: Pipeline of projects for replication developed and supportive regulatory environment created</b>	
<b>Outputs</b>	<b>Activities</b>
2.3.1 Approximately 30 projects prepared for replication in facilities using modern biomass technologies	2.3.1.1 Development of standard questionnaire 2.3.1.2 Selection of most promising 30 enterprises for olive and other fruit processing industries for utilisation of industrial biomasses/wastes for energy purposes 2.3.1.3 Energy audits and feasibility studies prepared for bankable projects 2.3.1.4 Preparing the feasibility study, business plan and presenting them together with the investor to the bank for financing. This will be very important for securing replication projects installed
2.3.2 Tailored regulatory initiatives taken to ensure a sustainable expansion of biomass energy use across industrial sectors	2.3.2.1 Policy advice and support e.g. on the following topics:  Propose specific targets for the heat produced by industrial-biomass energy technologies by 2020;  Propose amendments to the building code and building law to encourage the installation of industrial-biomass energy technologies through a major renovation, including for meeting space heating and water energy demand for nearby consumers (e.g. public buildings);  Expand tax exemptions on imported industrial-biomass energy technologies equipment and materials from import duties and related taxes with associated safeguard mechanisms to prevent their illegal use;  Prepare a decree to set up an industrial-biomass energy technologies quality control system corresponding (to the extent feasible) to the relevant EU regulations and systems in place.  Design of a Guarantee of Origin scheme focusing on RE heat.

**Output 2.1.1: 200 policy-makers, industry representatives and investors made aware and trained to understand the benefits of modern biomass and new technologies, through 5 training workshops, dissemination of best practices and a guidebook for policy makers, project developers and investors on the procedures and development process of an industrial biomass project**

In most countries, biomass boilers are not yet perceived as a standard option. Building the trust and raising the awareness among the targeted end users, industries, mechanical and HVAC engineers, plumbers, local government and business decision makers about the technical feasibility and the environmental and cost benefits of biomass boilers technology is, therefore, essential for positive market development. As detailed in earlier sections stakeholders consulted made clear that the lack of awareness and capacity is a key barrier to technology uptake.

The activities under this subcomponent will complement the marketing efforts of the private sector by raising the awareness of the targeted industries on the benefits, economic feasibility and other characteristics influencing a positive purchasing decision. The biomass technologies in most countries consist of relatively small enterprises, which have difficulties to launch systematic and effective promotion campaigns themselves. The GEF-UNIDO project, without commercial ties, is in a better position to provide impartial and better trusted information to the targeted end users about the characteristics, financial and environmental benefits of the different biomass energy technologies, the available suppliers and installers and public support available.

**2.1.1.1 Development of national capacities in national agencies and associations**

Existing learning and training materials from other countries will be made available and will be translated and revised to the Albanian situation. The “train the trainer” and “learning by doing” approaches will be used to the extent possible especially for regional staff of ARDA (for technical issues related to industrial biomass industries), regional staff of the three local banks (for financial issues related to evaluation of investment on the industrial biomass industries) and the industrial sector associations. Apart from addressing the integration of biomass energy technologies within the different industries (focussed on the agro-processing industry) into building design and into their heating and cooling installations in general, the technical engineering of larger commercial biomass system will also be addressed. This will then feed into the long-term strategy to anchor the capacities in relevant national agencies such as NANR and ARDA. Support to NANR will assist in the



future support of a national body for renewable energy and support to ARDA will assist in their long term energy support to the agro-sector.

#### **2.1.1.2 Development of best practice reports**

Best practice reports, case studies and project flyers will be prepared based on the most successful demonstration projects related to each industrial-biomass energy technology: boilers; driers; briquetters; pelletisers and extracted crushed olive pits from olive pomace. This material will be disseminated through the awareness raising activities in 2.5.

#### **2.1.1.3 Development of guidebooks for policy makers, project owners and investors**

Guidebooks will be developed for policy makers, project owners and investors on the procedures and development process of an industrial biomass project. Two guides are foreseen which will target different stakeholder groups. Practical guidance will be provided to potential project owners and investors. The guide will be based on the results of the demonstration projects and the feasibility studies prepared, and will include best practice for planning, designing, installing and operating biomass projects. The guide will be useful not only for industrial owners with biomass waste but also for other establishments looking to invest in a biomass boiler and to purchase pellets or briquettes – eg. industry, schools, universities, hospitals and community centres. This would also draw on the international best practices and propose a set of guidelines and recommendations for suppliers and installers of systems to follow. A section on policy will review international policy measures which have assisted the biomass markets and the outcome from these measures. The advantages and disadvantages of the options will be laid out including tailored recommendations for Albania.

#### **2.1.1.4 Training workshops**

The training is to be targeted at both end-users of biomass technologies as well as trainers (train-the-trainers) who will ensure that the training is sustainable beyond the timeframe of the project. With this in mind, participants will be selected from industry, through the industry associations, as well as from MoE, MEI, MAF, ARDA, and NANR. In addition engineers and other key professionals, as well as the students in the associated fields will be involved, and will be informed about the opportunities provided by industrial-biomass energy technologies and different types of biomass equipment and trained to integrate them into the design of new buildings and the renovation of the existing ones (especially public building at commune level).

An indicative 200 policy makers and industry representatives will be trained through 5 training workshops. One or two workshops will be targeted at the trainers and the other 3-4 will be targeted at the end users and will be held in the regions. The new ‘trainers’ will be involved in the subsequent workshops in providing some of the training alongside a national expert. It is anticipated that ARDA, NANR and the associations will play a key role in this training and will be providing the training beyond the project timeframe. The training material will have been developed as part of the previous activities along with guidebooks and best practice reports. The material will also be available on the project website.

#### **2.1.1.5 Awareness raising and marketing campaign**

In addition to the activities outlined above there is a need to raise general awareness through marketing campaigns and targeted awareness raising. The purpose of the awareness raising is twofold – one to encourage the further uptake of biomass energy technologies by industrial owners with biomass waste and secondly to encourage energy users (residents, public building owners, industry and commercial) to install biomass boilers. The campaigns and the information mechanisms and channels will be carefully designed to reach the actual decision makers. This can be either in a specific market segment (different industries, single-family house owners, hotels, larger public sector buildings, industrial facilities etc. to promote utilization of biomass olive boilers) or a geographical area. Wherever possible material from previous UNIDO projects will be used. Demonstration projects can also be a useful tool to support awareness and promotion campaigns. Hence, besides complementing the marketing efforts of the private sector, the approach to build and utilize the materials already available reflects the incremental nature of this component.

The general awareness raising activities will be complemented by educational activities for industrial and food engineers, building, energy and environmental engineering branches of the university as well as by specific articles or supplemental annexes in the professional magazines dealing with energy and environment, thereby targeting those professional groups that are often influencing the decision making of the final end-users.

Under this activity, a specific industrial-biomass energy technologies **web-site** will be developed with a database of the technologies, case studies, policies and other relevant information, which will act as the main tool for dissemination of information and knowledge gained during the project. This portal will be the ‘place to

visit' for anyone who wants to get any information on the use of biomass waste for energy. This website will be instrumental in promoting biomass applications in Albania. The Project Management Unit will continue to track the evolution of the technology, output, the industrial sector and regulatory environments, and will ensure the website is updated. The website will be linked to by ARDA and NANR.

The activities will be coordinated by the PMU, which will seek to establish contacts and enter into co-operation with various information channels and program formats in TV and radio and use also printed materials (newspaper and magazine articles, leaflets, posters), public discussion events etc. in reaching its objectives. In particular the PMU will work with ARDA which already works in information dissemination to ensure that anyone from the targeted sectors will receive information relating to all their business as part of their 'one-stop-shop' service.

#### **Output 2.2.1: Short- and medium-term potential for modern biomass applications for industrial uses assessed, and the way forward for replication across sectors developed**

##### **2.2.1.1 Detailed market survey and assessment of the short and medium term potential**

A detailed sectoral assessment will be carried out with a focus on the olive oil sector and other key sectors including wood processing, wine production and jam-fruit production<sup>11</sup>. This work will be carried out through market surveys related to technical, economic and financial energy potential (expressed in ktoe) related to each of these sectors with the potential for respective appropriate technologies to be introduced based on the least cost concept.

As part of this the key financial sector stakeholders and local suppliers will be informed of the specific characteristics and opportunities provided by the Albanian industrial-biomass energy technologies market (by building on the results of the market analysis), and on the experiences and lessons learned from the financing models tested in other countries.

##### **2.2.1.2 Strategy for replication and scale up developed**

The strategy for scale-up will kick in in the second half of the project following the mid-term review. New business plans for other agro-industry sectors will be developed and the financial and institutional mechanisms for national ownership will be increased by expanding the involvement of the national partners, including ARDA, NANR, and sector associations.

Once there is a clear idea of the short and medium term potential for modern biomass applications a sustainable strategy for scale up will be designed. The associations, NANR and ARDA will be the key players in helping to identify the way forward ensuring it is in line with current practice and policy and builds on past experiences. The outputs from project component 1 will provide a strong basis for the replication of the technologies: through the technical and financial demonstration projects demonstrating to other industries what can be achieved; whilst at the same time the banks will gain experience of this market, will better understand the risks associated with such projects and will therefore be more open to lending to future projects. The first (30) replication projects (within the time scale of this GEF-UNIDO programme) will receive additional technical assistance to help them get towards a bankable plan thereby further assisting these projects to get finance.

At the same time options will be investigated to further encourage the market through the use of existing agri-processing bank guarantees for biomass based technologies as well as proposing new financing instruments and business models (such as specific purpose bank loans, vendor financing, ESCOs etc.) specifically tailored and marketed for the industrial-biomass energy technologies purchase offered to the end users as a part of the overall marketing package. As the Paying Agency, ARDA will be actively involved and look to extend the scope of EU funding to energy technologies.

In addition to traditional bank finance, work will be carried out to develop sustainable financial incentive mechanisms by using the resources of the EE/RES/Environmental Protection Fund or other public resources. The rationale for use of these funds will be based on the positive experiences and outcomes of the demonstration projects. This will be discussed with the key stakeholders and agreed proposals for the required financial and fiscal incentives and their effective operationalisation submitted for final Government approval.

#### **Output 2.3.1 Approximately 30 projects prepared for replication in facilities using modern biomass technologies**

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<sup>11</sup> Some evaluation of the olive oil sector has already been carried out as part of the PPG but there are no studies for the other key sectors. Information on the olive oil sector is included in the Technical annexes.

Following the commencement of the training and awareness raising activities a standard questionnaire will be developed and distributed among 50 industries. These industries will be selected by the industry associations involved in the project. Based on the data gathered and using the selection criteria developed in Project Component 1 these will be processed to select the 30 most promising enterprises for carrying out initial simple energy audits.

Based on these energy audits and experience gathered from the demonstration projects the 30 enterprises will be assisted in the technical and financial design to complete feasibility studies and prepare bankable plans for replication projects at their premises (using the guidelines developed earlier). A national consultant will be employed to help the enterprises to develop their projects and to propose the projects for finance from banks.

Installation of replication projects will be based on the experience gained from the demonstration project and national consultant will assist them in defining technology selection.

### **Output 2.3.2 Tailored regulatory initiatives taken to ensure a sustainable expansion of biomass energy use across industrial sectors**

Tailored policy recommendations will be developed for supportive instruments and regulatory measures to provide a stable and stimulating investment environment for the accelerated uptake of biomass technologies across industrial sectors in Albania. The policy support will target industrial units providing biomass waste and seek to drive the consumer market (through regulations and incentives) for the demand of biomass as an energy source. The project will support the National Agency of the Natural Resources (responsible state institution) to assist them with the preparation of (a number of) the following specific policy and regulatory proposals which will form secondary legislation under the RES and EE laws<sup>12</sup>:

- Setting of specific targets for the heat produced by industrial-biomass energy technologies by 2020
- Proposing amendments to the building code and building law to encourage the installation of industrial-biomass energy technologies through a major renovation, including as a source to meet space heat and water energy demand for nearby consumers (e.g. public buildings);
- Propose exempting the imported industrial-biomass energy technologies equipment and materials from import duties and related taxes with associated safeguard mechanisms to prevent their illegal use;
- Proposing a decree to set up an industrial-biomass energy technologies quality control system corresponding (to the extent feasible) to the relevant EU regulations and systems in place. This could include development of relevant standards and a certification scheme;
- Implementation of a Guarantee of Origin scheme: assist the GoA in this requirement under the EU Directive for renewable energy and/or investigate the adoption of Guarantees of Origin for renewable energy heat (output level) as a regulatory option to provide incentives specific to heat produced from renewable energy sources, to facilitate export and/or assist in putting in place the relevant infrastructure (database; software; procedures etc) to monitor, report and certify renewable energy.

#### **A.5.2 Value added through incremental reasoning**

Sector analysis, review of existing barriers, meetings with various stakeholder groups and discussions with other agencies regarding bio-waste for energy - all carried out during the project preparation phase - have shown the strong relevance of the GEF-UNIDO project, its additionality, incremental reasoning, cost effectiveness and complementary to ongoing and planned national and international programmes to promote and support increased biomass energy use in Albania.

GEF funding is being requested to provide the incremental policy, technical and financial inputs required to support and effectively leverage national efforts in setting up and maintaining an infrastructure capable to support development and implementation. The funds will help stimulate the creation of demonstration of modern bio-energy technologies in general and the olive production sector in particular; the development of the enabling market environment through supporting the development of appropriate technological and environmental standards and enhanced awareness and capacity of the targeted industries (focus in olive oil industries, wood processing, wine production, jam-fruit production) and building up professionals to consider and integrate technologies for olive pomace boilers into different types of buildings (information).

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<sup>12</sup> From this list the most urgent and prioritized of these actions will be selected in consultation with the government stakeholders for assistance under this project.

#### **A.5.2.1 Business-as-usual scenario**

The olive oil industry (and other sectors including wood processing, wine production, jam-fruit production) rely on fossil fuels to meet their heat energy requirements although a small percentage of their existing waste is used in inefficient boilers. The high cost of fossil fuels and the fluctuating and volatile oil market create a significant burden on industry. In addition the reliance on fossil fuels for heat results in relatively high greenhouse gas emissions. In 2011 the GHG approximate estimations from the above mentioned targeted industries was 715,000 tCO<sub>2</sub> eq.

There is no experience in Albania with efficient olive pomace boilers or with pellet or briquette machines. Since this is a completely new market there are significant limitations in terms of the capacity of the stakeholders to kick-start this market. Factory owners are unaware of the opportunities and the finance institutions do not have experience of the technologies and therefore do not understand the risks and opportunities and so would not lend to potential projects. Existing support initiatives do not cover these technologies.

The Government is well aware of its resource and capability constraints and for this reason is seeking international support from both multilateral and bilateral donors.

In the absence of the proposed GEF-UNIDO project it is unlikely that the new technologies (efficient pomace boilers, pelletisers and briquetters) would be introduced into the Albanian market despite the huge potential and benefits available from their introduction. The factories would continue to use their over-sized inefficient boilers or buy 'new' second-hand fuel-oil boilers when a replacement is necessary, with their associated GHG emissions. Many industries will continue to be reliant on fossil fuels and impacted by changes in world oil prices.

The vast majority of potential stakeholders will continue to suffer from lack of information, understanding and technical capacity of the biomass waste to energy opportunities. It is unlikely that there would be any demonstration projects showing what is technically feasible and financially viable.

Without support no new supporting policy or recommendations can be prepared since there is a lack of resources to enable it to happen.

In conclusion, in the short-term, the baseline scenario would not be able to address the barriers to the uptake of efficient biomass waste to energy technologies and therefore there will be little change in the investment. The underlying critical problem of the lack of awareness of opportunity, lack of adequate institutional capacity and supporting policy and good technical expertise and skills on the market would remain unresolved. The potential for the use of biomass waste, particularly in the olive oil industry, would remain only potential and would not be realized; further fossil fuelled heat generation would be built with consequent GHG emissions that could otherwise be avoided.

#### **A.5.2.2 GEF Project Alternative scenario**

**At the technology level** the project would provide biomass waste to energy project-specific technical assistance and financing support through Project Component 1 by facilitating the implementation of selected demonstration projects with high replication potential in Albania. GEF financing is sought to provide assistance a minimum of 15 demonstration projects in the olive oil industry and for technical assistance to a further 30 replication projects. The GEF co-financing would facilitate these projects to get off the ground by leveraging co-finance and by providing technical assistance. Without the GEF support these projects would not go ahead. GEF would support 15-25% of the incremental investments and will be responsible directly for an additional 1.2 MW<sub>th</sub> of installed biomass boilers with annual heat generation capacity of approximately 800 MWh per year, plus the installation of pelletisers and briquetters allowing further biomass to be sold into the market for heat generation. The implementation of these projects would generate Albanian case studies and demonstrate success stories which will then be disseminated through the other project activities. This is expected to fuel the interest in further biomass technologies and reduce the associated perceived investment risk.

**At the institutional level** the GEF financing would add the technical assistance needed to strengthen local expertise, knowledge and capacity in developing, implementing and maintaining effective biomass waste to energy projects and programmes. In particular the project will allow ARDA, MoE and NANR to become leaders in the field and lead on the continued market development.

**At the sector level** the project would target all players. To financiers, managers and engineers, the project would provide the knowledge to fully understand the economic and environmental benefits of biomass energy projects; and the technical capacity and tools to take projects forward. A marketing and awareness campaign targeted at several sectors will increase awareness of biomass to energy potential and benefits, and will boost demand for further projects creating the pull for market creation. Specifically the industry associations will be in a position to ensure the replication of the projects with their members.

**At the policy level** the project would provide the additional technical assistance needed to strengthen the policy support frameworks of NANR to provide the incentives and assurances required to facilitate investment in biomass energy projects. GEF financing is sought to support the development of proposals for consideration of tax exemption measures and on standardisation and certification of biomass technologies.

Considering the proposed structure of the GEF-UNIDO project, its implementation will provide critical contributions for the creation of a market environment that will facilitate the creation of a market in biomass waste to energy technologies.

#### **A.5.3 Global environment benefits**

The investments as part of the technology demonstration (a minimum of 15 olive oil factories will introduce biomass boilers, driers, pelletisers and briquetters based on the needs of each factory) are initially estimated to result in 53,000 tCO<sub>2</sub>eq (direct GEBs) emission reduction over a 20 year lifecycle duration of the systems. The additional 30 replication projects are likely to result in double this figure of emission reductions (106,000 tCO<sub>2</sub>eq). Using emission factors for diesel oil, as released by the IPCC, it is estimated that the total emissions from the olive oil sector alone amounts to more than 650,000 tCO<sub>2</sub>eq.

After the completion of this project, investments are expected to be increased due to the long term outcomes of the project activities; the policy component will strengthen the policy and institutional framework to enhance penetration and scaling up of the use of olive oil, and other processing, waste for energy by SMEs; awareness raising and capacity building activities will contribute to significant indirect CO<sub>2</sub> emissions reduction.

Considering the olive oil industry as well as other fruit processing, a conservative estimate for a replication factor of 3-5 can be used on the demonstration projects, which will result in deployment of a further 45 biomass projects with the cumulative amount of emission reductions achieved at 318,000 tCO<sub>2</sub>eq over the project and post-project duration. Using the GEF top-down methodology, indirect emission reductions attributable to the project are estimated at 240,000 tCO<sub>2</sub>eq. The range of indirect CO<sub>2</sub> emission reductions is therefore 240,000 to 318,000 tCO<sub>2</sub>eq.

More information on how the emissions reductions were estimated is provided in Annex G.

#### **A.5.4 Innovativeness, sustainability and potential for scale-up**

The strategy for long-term national ownership has been described in the components; to ensure sustainability and replication in other sectors. The focus of the activities is to develop national capacities, particularly within ARDA, NANR, the industry associations and banks since these organisations are in the best position to replicate the activities and build the market. ARDA will extend its outreach into energy technologies for the agro-processing industries, NANR will implement tailored policy, the industry associations will engage with their members to raise awareness and ensure that they are aware of the benefits., and the banks will be in a better position to lend to such projects.

The outputs to be generated by the GEF UNIDO Project will contribute to creating an enabling environment for a national market in biomass waste to energy use. All planned outputs are consistent with and instrumental to achievements of this and are designed to create long term sustainability. The concrete investment projects will assist the financial sector in assessing modern biomass technology applications in Albanian for SMEs through the provision of tools and training to evaluate such proposals in the future. The training and dissemination activities, together with the pipeline development will increase the awareness and use beyond the initial scope of the olive oil sector and ensure long term capacity. Specifically:

##### *Project Component 1 – Technology demonstrated for use of modern biomass technologies in industrial processes in Albania*

The feasibility guidelines and manuals developed as part of this component will help agro-processing owners to understand the options available to them and to make informed choices therefore increasing the replication potential of the project. The guidelines will continue to be available on the website beyond the project ensuring their continued availability.

Most importantly demonstrating the technical feasibility and commercial viability of the biomass projects provides national examples that can be replicated across the country. The pilots will be selected using a number of criteria including their GHG emission reductions and their replicability as outlined earlier. Not only will the demonstration projects show what is possible and the examples be disseminated widely in the country, but the implementation and operation of these projects will build up the technical capacity within the stakeholder groups to help in the replication of these projects. Given the commercial interest in these projects, the different proponents will have an interest in keeping the projects running and hence sustain the global environmental benefits beyond the life of the project. It is anticipated that the potential financial gains and the improved competitiveness the technological innovation will bring to the factories will create the willingness and openness from factory owners to participate in the project. Energy audits and the pre-feasibility in 15 factories has shown that energy costs amount to about 14-22% of the production cost (through diesel, oil and grid electricity) and that a replacement through available biomass resources could generate financial savings of up to 13,000-20,000 USD. Also, selling the surplus olive pomace biomass (in the form of pellets or briquettes) will bring a substantial income of 50,000-60,000 USD. The project will work closely with the industry sector to create the awareness among the target enterprises, both for the demonstration phase and the replication phase.

#### *Project Component 2 – Development of the enabling market and regulatory environment for biomass technology in industry*

Key to the sustainability of the initiative is the availability of finance for future projects. The involvement and increased awareness of the financial institutions will make a critical difference to the future availability of finance. Therefore this component will focus on facilitating the availability of finance. The component will support 30 replication projects with technical assistance, further increasing the number of successful demonstration projects and providing the experience to convince the financial institutions to lend for such projects beyond the project timeline.

During the GEF project implementation period not only will stakeholders be trained directly but trainers (component 2.1) will be trained to ensure that the training continues beyond the timeframe of the project. Trained biomass energy experts will continue offering and providing training as result of increased demand, kicking-off the development of provider start-ups and the growth of a national market.

The project is expected to generate the level of awareness needed to boost the interest in and demand for biomass waste to energy projects. It will seek the involvement and active participation of private sector organizations, such as the industry/sector associations, which can rely on well-established national networks and platforms. The awareness and capacity built through the project through marketing campaigns and a website will stimulate the development and implementation of new projects and generate additional GHG emission savings. This component will build further on the demonstration projects from Project Component 1.

Finally, the project activities will feed into government policy and incentives to ensure that the supportive regulatory framework is in place for the emerging biomass waste to energy market.

Therefore, these two project components are designed so as to ensure the sustainability of global environmental benefits beyond the life of the project.

## A.6 Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these risks:

Table 5 present in detail risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and mitigation measures that address these risks.

**Table 5: Detail risks, including climate change, potential social and environmental risks and mitigation measures that address these risks.**

Risk Factor	Description of risk	Risk Level	Mitigation measures
Policy	Lack of government commitment to support the project	L	The project objectives and activities are in line with national policies and objectives. The project will actively involve representatives from relevant ministries to ensure their full support throughout the project and beyond. Ministry of Energy and Industry has signed cofinancing letter in support of the project as it will contribute to achieving Albania's RES targets.
Technical	Targeted technologies fail	L	Suitable sites will be selected through careful analysis of target sectors and plants. Energy audits carried out together with pre-feasibility studies shows that technical risk is minimal, because the targeted technologies (efficient olive biomass pomace boilers, olive pomace driers, olive pomace briquetters and olive pomace pelletisers) have been used very successfully for 20 years in neighbouring countries. Technical assistance will be provided for the identification of proven technologies, quality audit of equipment, implementation guidance by experts, training to the operating personnel in the industry
Finance	Lack of interest among banks and FIs for large scale uptake	L	The Albanian banking sector has been closely involved during the PPG phase and these banks are very committed to finance this type of project and olive oil pomace energy technologies as shown through their cofinancing Letters. Proper dissemination of the results will be organised to raise awareness among banking sector.
Environmental and social	In case any possible Social and environmental safeguards issues occurred	L	In the 15 enterprises audited only 8-16% of olive pomace generated are used inside the olive oil factories. About 5-10% of olive oil pomace is sold to the market and the other 80% is dumped. Introducing olive oil pomace energy technologies will help to increase the amount of olive oil pomace to be used for technological purposes and thus reduce the amount dumped into the open environment. It will be ensured that no non-sustainable sources for the production of pellets are used (e.g. by aligning to national policy whereby a licence from the Ministry of Environment is required). If found feasible, sustainability indicators will be developed for future replication and large scale projects.
Climate change risk	The technology or renewable resource is affected by climate change	L	RE technologies using organic waste streams are very little impacted by climate change  There is no detailed information on the impact of climate change on olive oil plantations (e.g. through changing patterns in temperature and rainfall over the year), yet due to the olive tree being a relatively resilient species the risk is deemed low

## A.7. Coordination with other relevant GEF financed initiatives

There are currently no tailored initiatives focusing specifically on the development of a modern biomass utilisation for industrial applications. Other GEF financed initiatives are only marginally relevant to this project. Past and ongoing initiatives have been focusing on RES market development, including other GEF projects including one on the market for traditional biomass (fuel wood) (including the GEF-UNDP survey titled "Market Analysis of the Fuel Wood Consumption in Residential, Commercial and Service Sectors, SME Industries and in the Agricultural Sector in Albania - 2007"), and on increasing efficient use of firewood boilers. The project will align its efforts with related initiatives such as the Regional EBRD Project "EBRD



Western Balkans Sustainable Energy Direct Financing Facility ("WeBSEDF")" and the GEF/UNDP Project "Global Solar Water Heating Market Transformation and Strengthening Initiative: Albania Country Programme". It is envisaged that these activities will contribute to Albania's RE Target Action Plan as to industrial use of renewable energy sources focused on modern biomass as well as secondary legislation targeting the increased deployment of renewable energy technologies.

UNIDO will be able to draw upon the experience gained from its portfolio of relevant and mainly GEF funded projects on bio-energy, including in Ukraine (low-carbon technologies in bakery industry, gasification in wood-processing sector, biogas from organic farm waste to provide heat and electricity for on-farm needs), India (biogas from organic-waste streams in agro-industrial subsectors), Uruguay (biogas and other low carbon waste utilization technologies), the Dominican Republic (biomass for electricity generation) and Chile (biogas for agro-industries). Furthermore, UNIDO has carried out projects in Nigeria (rice husks for electricity), Thailand (bamboo waste from chopstick industry and rice husks for energy), Sri Lanka (bamboo waste processing into pellets).

## **B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:**

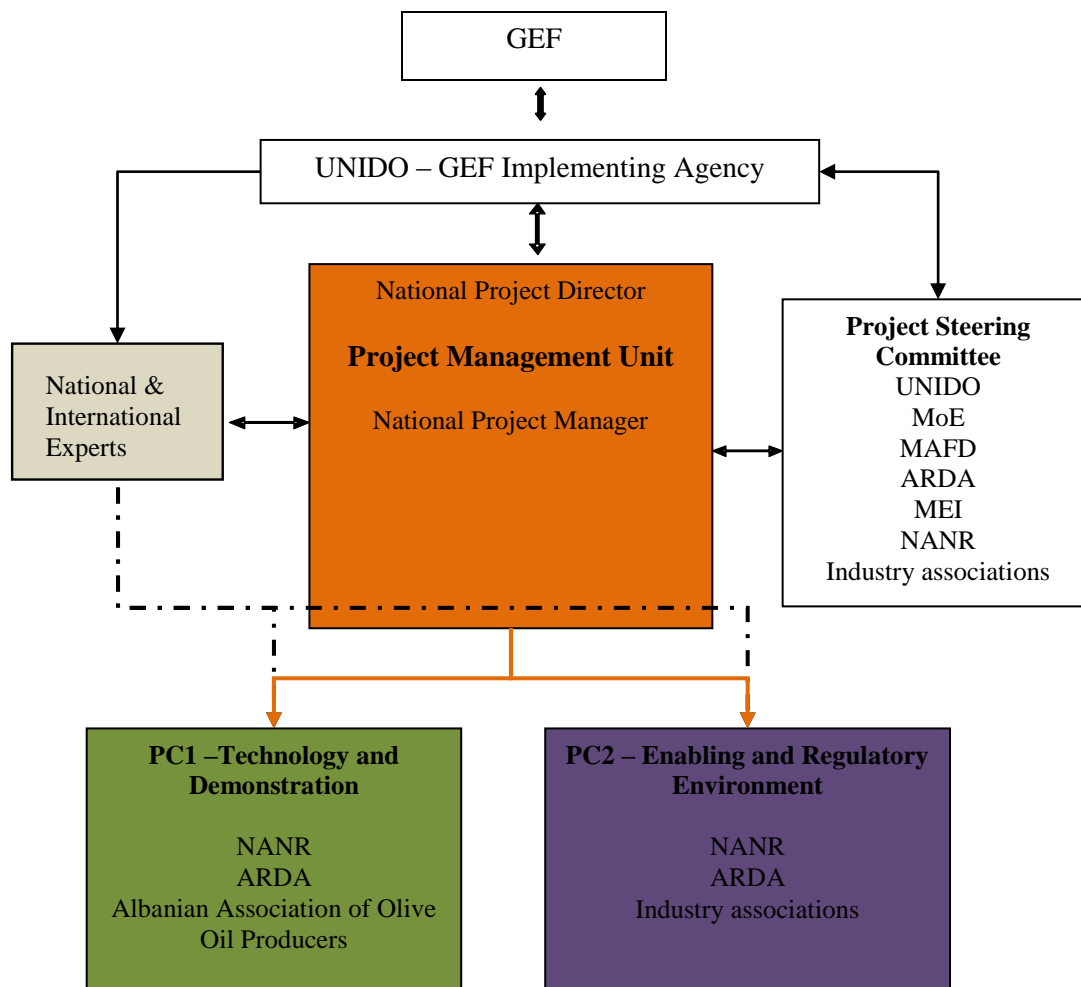
### **B.1 Describe how the stakeholders will be engaged in project implementation.**

To achieve the objectives of this project a large number of stakeholders from Government, industry and financial institutions need to be engaged in the project. Primary target beneficiaries of the project are energy policy-making and implementing institutions, primarily MEI, NANR, ARDA, industrial unit owners (end beneficiaries), designers, installers, training institutes, energy professionals, service providers and the financial sector. Importantly, to create a biomass heating market, the national industrial associations will be key stakeholders in helping industries opt for demonstration projects and post project scale up. The outcomes of the planned project activities and potential recommendations for bridging the gaps have been discussed with all the potential stakeholders during the PPG stage. A list and summary of their intended roles is provided in the following table.

<b>Stakeholders</b>	<b>Involvement in the project/role</b>
<b>Government</b>	
Ministry of Environment (MoE)	MoE is responsible for implementation of the state policy in the field of environment protection, rational use of natural resources, nuclear and radioactive safety. MoE also executes state control concerning environmental protection, rational use of natural resources, ecological safety, as well as state supervision of nuclear and radioactive activities. MoE will also issue permits to those organisations manufacturing pellets or briquettes.
Ministry of Energy and Industry (MEI)	MEI is expected to act as a major government stakeholder, as MEI is in charge of developing and implementing state policy on RES in general and biomass usage in particular. MEI will be on steering committee and will be actively involved in drafting and approving secondary new legislation as needed to promote the energy biomass (as waste from different industries: focus in olive oil industries, wood processing, wine production, jam-fruit production) technologies programme.
The National Agency for Natural Resources of Albania (NANR)	NANR is the agency under the MEI responsible for all natural resources, including renewable energy, and will act as the focal agency for technical and energy policy related activities. NANR is also expected to provide co-funding requirements, initiate policy action and facilitate the process of bringing other stakeholders on board.
Ministry of Agriculture and Food (MAF)	With MEI, as applicable, for exploring the possibility for utility driven delivery and financing mechanisms as a part of a broader strategy for whole chain of olive sector.
Agriculture and Rural Development Agency (ARDA)	ARDA is an agency under MAF and its principal aim is to promote the Albanian government's financial support to the rural sector with direct payment to farmers. The basic functions of ARDA are related to the implementation of the national policy and measures in the agro-food sector and rural development; implementation of measures of the pre-accession program, preparation for the implementation of the measures according to Common Agriculture Policy (CAP). ARDA will support rural financing improving the rural infrastructure and encourage rural investments. Financial support of the rural sector will not only contribute to reducing poverty, but also to growth of national production, its competitiveness and sustainable development. ARDA's challenge is to contribute to the transformation of Albania's rural sector from subsistence-oriented production into a modern, commercial, and competitive sector respecting future EU requirements and standards. In recent years, financial support to farms, agricultural and agro-industrial enterprises has increased with emphasis on fruit trees (particularly olive trees), vineyards, vegetables and animal farming, as well as on the

	<p>industrial processing of fruit (particularly olive oil), grapes, vegetables, milk and meat, on the basis of the advantages on the different areas of the country. The principal selection criteria for financial support of ARDA are efficiency of proposed project and promotion of collaboration between beneficiaries in order to develop access to market and sustainable investments. Besides ongoing institutional changes, the evolution of the rural institutional structure in Albania continues to be a complex process. Consequently, the needs to enforce the institutions are evident and demand more responsibility from the State and civil society.</p> <p>Based on consultations with ARDA they are expected to be a key execution partner for this project involved in both the fund management and disbursement as well as in capacity building activities, building on ARDA's existing one-stop shop information service to the agricultural sector.</p>
<b>Private sector and other stakeholders</b>	
NGOs /CSOs	NGOs will be involved with regard to awareness raising and training and to the technical and environmental indicators for biomass usage. In particular the industrial associations which could benefit from modern biomass used for energy purposes. This includes the Albanian Association of Olive Oil Producers (AAOOP), Albanian Association of Food Producers, Albanian Wine Producers Association, and Albanian Agribusiness Associations, who will be responsible for raising awareness amongst their respective members. The AAOOP has been actively involved during the project design.
Target enterprises	During the PPG Phase, 15 energy audits were conducted in olive oil units across Albania. Based on the field visits data and the results from the energy audits, 15 pre-feasibility reports were prepared. Industry owners will be an integral part of the project as the key beneficiaries and have already formally expressed their wish to cooperate in this area. In addition to hosting demonstration projects and scale-up projects they will be involved in stakeholder consultation, in training and awareness activities.
Technology suppliers, traders, dealers and installers	For the demonstration and replication projects local and international companies could be involved in the introduction of a voluntary (which may later graduate to a mandatory) quality control scheme with associated capacity building. Both Greece and Italy have a relatively mature manufacturing sector with excess capacity. Possible links and co-operation possibilities with the foreign manufacturers and industry associations will be further explored during the implementation of the project.
Banking sector	Domestic banking community will develop and introduce attractive financing products for energy industrial-biomass technologies purchase. In particular Credins Bank, Pro-credit and BKT have expressed their interest to enter this sector. As part of this project these banks will receive training and a guidebook to help assess biomass technology projects.

## Indicative Project Management, implementation and execution structure



- *UNIDO*: as the GEF Implementing Agency holds the ultimate responsibility for the implementation of the project, the delivery of the planned outputs and the achievement of the expected outcomes; UNIDO will be responsible for monitoring of the project, and reporting on the project performance to the GEF.
- *UNIDO-ARDA relationship*: The UNIDO-GEF funds for the grant instrument are expected to flow through Agriculture and Rural Development Agency (ARDA) (through a dedicated fund). ARDA is not only the institution to realize public support for farmers, but is an institution to realize Special Pre-Accession support from the EU for rural development and other payments according to the EU suggestions. Further details on ARDA are provided in the section on stakeholder involvement. UNIDO and ARDA may enter into a contractual relationship to formalise the roles and responsibilities, and the detailed Terms of Reference will be agreed in consultation with the other main government stakeholders through the Project Steering Committee (PSC). The PSC will also endorse the methodology to prioritise project proposals, and in providing strategic guidance to the project scope and work plan. It is anticipated that the contract between UNIDO-ARDA will cover the grant phase (within component 1 of the project), and if deemed appropriate, (some of the) capacity building activities (e.g. the development of detailed procurement manuals, technical assistance towards beneficiaries in terms of the actual procurement procedures). This will be part of the completion of the Terms of Reference during the project start-up phase.
- *NANR/AKBN*: advises the Minister responsible for energy, the government and relevant ministries on energy related issues. NANR is expected to act as the national focal agency on the energy part for this project, in close cooperation and consultation with MEI, MoE and MAF as AAOOP. These will be the main consultation partners and are expected to constitute the PSC for the project implementation phase.
- *National Project Director*: The executing agency will appoint a National Project Director (NPD), who will be responsible for the government coordination in support of the project. The NPD serves as the focal

point on the part of the Government of Albania to ensure effective communication between the government and other relevant national stakeholders/actors, and monitors the progress towards expected outputs and strategic results of the project.

- *Project Steering Committee*: will be established during the start-up phase of the project for supervising and guiding the project implementation, with the expected participation of MEI, MoE, MAF, NANR, ARDA, Albanian Association of Olive Oil Producers as well as representatives of other institutions providing direct cost-sharing for the project activities. The responsibilities of the PSC are envisaged to consist of:
  - Providing the necessary political support to the project implementation;
  - Commenting on project work plans and progress reports;
  - Mobilizing cost-sharing and follow-up financing;
  - Assuring coordination between this project and other ongoing Gov't activities and programmes;
  - Assuring all stakeholders are appropriately involved in the project planning and management;
  - Facilitating linkages with high-level decision-making.
- *Project Management Unit (PMU)*: will be responsible for the day-to-day management of the project. The location of the PMU will be in Tirana (exact location to be decided). The PMU will consist of a national project manager and, if required and justifiable in the available budget, supported by professional and administrative staff. It is anticipated for the PMU to be supported by an (international) bio-energy expert (or company) to ensure that international best practices and experiences about relevant activities in other countries are adequately taken into account in project activities. Through networking, the PMU is also expected to enter into partnerships with different foreign institutions, incl. certification bodies, testing centers etc.

At the beginning of project implementation a detailed work plan for the first year of implementation will be detailed by the PMU, based on the overall work plan for the entire duration of the project, and will be endorsed by the PSC. The yearly work plan will clearly define roles and responsibilities for the execution of project activities, including monitoring and evaluation; it will set milestones for deliverables and outputs. The overall and yearly work plans will be used as management and monitoring tool by PMU and UNIDO and the overall work plan will be reviewed and updated as appropriate on a regular basis.

#### Coordination with other related (non-GEF) initiatives

Ministry of Energy has started a new project in September 2013 titled "Energy Sustainability for Adriatic Small Communities" (ALTERENERGY). The ALTERENERGY Strategic Project aims to provide a significant contribution to the widely agreed objective of achieving a higher level of sustainability with regards to energy production and usage in the Adriatic area. This objective is strictly connected to creating a better environment and the protection of life and the natural environment. As it was mentioned in previous session all oil factories are allocated in Adriatic coastline communities (olive trees are growing in those areas) and so there are clear synergies between the two initiatives. In pursuing this overall general objective, the proposed project follows a very specific vision: that of promoting energy sustainability in the small communities of the Adriatic area, through an integrated approach to the efficient use of energy and its production from renewable sources. In this direction promotion utilisation for energy purposes of industrial biomass (focus in olive oil industries, wood processing, wine production, jam-fruit production). The main focus of ALTERENERGY is the optimal integration of these systems, allowing a higher degree of global energy sustainability at community level. The specific objective of ALTERENERGY is to develop replicable models for the sustainable management of energy resources in small Adriatic communities, improving their capacity to plan and manage integrated actions dealing with energy saving and energy production from renewable sources. The main expected results are:

- Sharing of integrated sustainable energy management models, suitable for the small communities of the Adriatic area.
- Improved capacity of local communities to plan, implement and manage energy saving and distributed energy production projects/actions.
- Improved awareness, of citizens and local economic operators (SMEs, professionals), of the opportunities and benefits related to energy efficiency and energy mix changeover and the diffusion of project results on a wide European scale.

- Good practices for the development of integrated energy sustainability plans in small communities, taking into particular account the issues of global sustainability and participated consensus.
- Good practices for the integration of different technology options and solutions and the set up of proper energy management models in small communities.
- Business matching and business development support to SMEs operating in the energy sector in IPA area.
- Implementation of a limited number of pilot projects, selected in order to maximize their potential impact as reference models for the whole Adriatic area and beyond.

Ministry of Energy through ALTERENERGY project will finance EE/RES Measures in 10 public buildings (as pilot projects) in small Adriatic communities of the Lezha and Lushnja areas. In order to take forward the use and promotion of biomass energy based heating applications about 1.7 MEURO (2.36 MUS\$) (in kind contribution for introducing EE/RES measures in general and new biomass heating systems with olive oil pomace in particular) for meeting space heating and water heating energy demand for 10 schools at the Lezha and Lushnja areas. These schools would provide welcome markets for the pellets and briquettes that will be produced as a result of the proposed GEF UNIDO project.

**B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):**

To ensure that men and women can equally benefit from development projects and that gender inequalities in activities and outcomes are reduced or eliminated, gender differences need to be considered during the entire project cycle – from design and implementation to monitoring and evaluation. By systematically mainstreaming gender into their interventions, UNIDO's Energy and Climate Change Branch (ECC) aims to ensure equal opportunities for both women and men, thus furthering UNIDO's inclusive and sustainable industrial development agenda and contributing to the achievement of the Millennium Development Goals (MDGs), and the Post-2015 development framework, as well as the Sustainable Energy for All (SE4ALL) objectives. In order to "demystify" gender mainstreaming and provide practical guidance on how to systematically address existing or potential gender inequalities specific to UNIDO's energy and climate change interventions, a tailored guide has been developed aimed at helping the staff of UNIDO's ECC Branch to apply a gender perspective to their work and, more specifically, to mainstream gender throughout the project cycle. It is anticipated that a gender expert will be recruited to monitor the gender-specific dimension of the project and provide guidance to maximize the impact.

In general, almost all olive oil and food processing SMEs are located in villages and small towns, where unemployment ratios are high at the level of 20-25%. Women constitute up to 40% of the work force in these companies, which often provide for the main source of local income generation together with their work in agriculture sector. Therefore support in strengthening such SMEs through utilisation of biomass energy will promote favourable social and economic conditions of women entrepreneurs and workers in these regions.

The results from the PPG phase suggest promising cost effectiveness based on relatively limited investment cost and payback periods as low as 3-5 years. While these figures will need to be confirmed through additional analysis and their techno-economic parameters, it is clear that the introduction of innovative and cost-effective technologies will strengthen the competitiveness of the individual enterprises and the local economy.

In order to facilitate replication in the olive oil sector as well as in other fruit- and agro-processing sectors where biomass is available (focus in olive oil industries, wood processing, wine production, jam-fruit production), a pipeline of projects will be developed through targeted technical assistance and an appropriate support and financing instrument will be developed to provide the financial resources for this type of intervention. In terms of sustainability the project will trigger the following social and economic benefits at the local and national level:

- Raise employment opportunities in rural areas where latent unemployment (especially women) is a particular problem;
- Reduce costs for enterprises through meeting heat energy demand for industrial processes, space heating demand and for the preparation of hot water within olive oil industries and utilization of olive pomace sufficient for selling it to open market to meet residential, private and public buildings space heating demand;

- Reduce environmental impact by utilisation of waste from olive oil industries, wood processing, wine production, jam-fruit production, etc.
- Develop the local economy as part of the reconversion for rural areas;
- Strengthen local capacity by increasing technical knowledge and capabilities for technology uptake;
- Bringing new financial product for financial institutions (RES and EE technologies);
- Reduce greenhouse gas emissions.

Overall the application of new and innovative technologies will introduce new skills and capacities at the local level, as well as in supporting services such as consultancy and operation and maintenance. It is anticipated that this will contribute to an increased competitiveness of the individual plants as well as the local and national economy as a whole.

### **B.3. Explain how cost-effectiveness is reflected in the project design:**

The project takes a comprehensive approach to address many of the barriers that are preventing the use of biomass waste being taken up widely, in particular those related to awareness and capacity as well as a supportive regulatory framework. The strategy for the project to achieve good cost-effectiveness is based on a number of principles: 1) build on and maximize leverage of national public and private resources; 2) industry-wide awareness raising of and capacity building in renewable energy; 3) select pilot projects primarily on the basis of their replication potential (and therefore direct and indirect avoided GHG emissions); and 4) searching and maximizing synergies with financial institutions for investment.

Given its focus on addressing policy and technical capacity barriers, this project will generate the biggest share of GHG emission savings after the project implementation period, when the new policies would be in place, capacity built and the training programmes established that will deploy their full impact in terms of new biomass energy projects. This project will result in:

- Direct emission reductions of 53,000 tCO<sub>2</sub>eq through its demonstration activities
- Target investment levels of 2.8-4.2 million USD by the end of the project in 2018 (leveraging at least 3 million USD for a 3:1 leverage ratio)
- Direct energy generation from demonstration projects totalling 16,000 MWh
- Post-project indirect emission reductions of 240,000 – 318,000 tCO<sub>2</sub>eq due to increased awareness and capacity to develop and finance biomass energy projects

Calculating the cost per tonne of direct reduction of emissions for GEF, the cost per tonne of abatement would then be 17.4 USD/tCO<sub>2</sub>eq. This figure is based on the total GEF grant for this project although many of the activities supported by this grant will support the long term effects rather than only the direct emissions. If the grant associated only with these projects is used then the cost per tonne of abatement would be 7 USD/ tCO<sub>2</sub>eq. Incorporating the post-project indirect reduction of emissions, the cost per tonne of abatement would reduce to as low as 2.66-3.5 USD/tCO<sub>2</sub>eq.

The GHG emission reduction calculation was based on the latest GEF methodology.

### **C. DESCRIBE THE BUDGETED M&E PLAN:**

Formal monitoring and evaluation (M&E) of the project will follow the principles, criteria and minimum requirements set out in the GEF Monitoring and Evaluation policy in its current version and the respective guidelines and procedures issued by the GEF Evaluation Office and/or the GEF Secretariat. At the same time, M&E will comply with the rules and regulations governing the M&E of UNIDO technical cooperation projects, in particular the UNIDO Evaluation Policy and the Guidelines for Technical Cooperation, both in their respective current versions.

The overall objective of the monitoring and evaluation process is to ensure successful and quality implementation of the project by:

- i) Tracking and reviewing project activities execution and actual accomplishments;
- ii) Leading the project processes so that the implementation team can take early corrective action if performance deviates significantly from original plans;

- iii) Adjust and update project strategy and implementation plan to reflect possible changes on the ground, results achieved and corrective actions taken; and
- iv) Ensure linkages and harmonisation of project activities with that of other related projects at national, regional and global levels.

A detailed monitoring plan for tracking and reporting on project time-bound milestones and accomplishments will be prepared by UNIDO in collaboration with the Project Management Unit (PMU) and project partners at the beginning of project implementation and then periodically updated.

The project targets and related indicators are defined in the logical framework presented in annex to this document. This framework will form the basis for the project M&E plan. Specifically the M&E plan will monitor the attainment of the following targets:

- a. Renewable energy heat delivered within olive oil factories (including outside residential, private and public buildings which are going to use pellets/briquettes for meeting space heating and water heating energy demand) and GHGs emission reductions directly generated by the UNIDO GEF project. These will include the type and the number of projects developed and implemented.
- b. Renewable energy heat generation within olive oil factories (and outside them) and GHGs emission reductions in-directly generated by the UNIDO GEF project. These will include type and the number of projects developed and implemented due to the increased capacity and conducive environment for the renewable energy projects.
- c. Renewable energy investment generated by the UNIDO GEF project, directly and indirectly
- d. Development of policy, legislative and regulatory frameworks aimed to promote and support the SME waste of olive oil industry and transforming them to be ready for utilisation to energy market
- e. Level of awareness and technical capacity for the use of olive oil waste for energy within relevant institutions, in the market and within enterprises.
- f. Overall socio-economic impacts of the project to include increase in productive capacities, access to modern energy services, cost-effectiveness and gender equality.

The National Project Manager will be responsible for day-to-day management of project activities and track progress towards milestones, coordination of monitoring and evaluation of the demonstration projects with respect to energy generation, technical performance, commercial viability, GHGs emission reduction and other related information.

The UNIDO project manager will be responsible for oversight and tracking overall project milestones and progress towards the attainment of the set project outputs. The UNIDO project manager will be responsible for narrative reporting to the GEF. The UNIDO project manager will be responsible for the preparation of Annual Project Implementation Reviews (PIR) and mid-term review as established in the M&E Plan.

A final external evaluation will take place at least two months before the completion of the project. UNIDO will make arrangements for the independent terminal evaluation of the project. The UNIDO project manager will inform UNIDO Evaluation Group at least 6 months before project completion about the expected timing for the Terminal Evaluation (TE). UNIDO Evaluation Group will then manage the TE in close consultation with the project manager.

The following table provides the tentative budget for the evaluation, which has been included in Project Component 3.

UNIDO as the Implementing Agency will involve the GEF Operational Focal Point and project stakeholders throughout project duration in order to ensure the use of the evaluation results for further planning and implementation.



## PROJECT'S INDICATIVE MONITORING AND EVALUATION WORK PLAN

Type of M&E activity	Responsible Parties	Budget USD*	Time frame
Inception Workshop (IW) and inception report	UNIDO Project Manager (PM); Project Management Unit (PMU)	0**	Within first two months of project start up
M&E design and tools to collect and record data (performance indicators) including survey to confirm baseline for industry, manufacturers, policy makers etc.	UNIDO Project Manager (PM); PMU and M&E specialists as required, including gender <sup>13</sup> expert	5,000	Within first two months of project start up and mid of project
Annual Progress Reports (APRs) and Project Implementation Reviews (PIRs)	PMU to prepare prior to the annual project review PM UNIDO to validate and finalize to submit to GEF	0**	Annually
Annual and mid-term Project Review to assess project progress and performance	PMU, PM UNIDO HQ and Project Steering Committee to review the project performance and make corrective decision	0**	Annually prior to the finalization of APR/PIR and to the definition of annual work plans
Steering Committee (SC) Meeting	PMU, PM UNIDO HQ and Project Steering Committee	0**	Annually coincide with the Annual Project Review and whenever urgent and important decisions need approval of SC
Project Executive Committee	PMU, PM UNIDO HQ	0	Every six months
Final survey to measure progress against baseline for industry and policy makers	UNIDO Project Manager (PM); PMU and M&E specialists as required	10,000	
Terminal Project Evaluation	UNIDO Evaluation Unit (ECA), PMU, PM UNIDO HQ and Project Steering Committee, independent external evaluators	30,000	Evaluation at least two month before the end of the project; report at the end of project implementation
Lessons learned	PMU, external consultants, UNIDO PM	0**	By the end of project implementation; annual as part of PIR
Visits to field sites	PM	0	Annually
	UNIDO HQ Representative from the Steering Committee	0	
<b>TOTAL indicative cost</b> * Excludes project team staff time and UNIDO staff ** The costs are covered under Project Management Costs		45,000	

According to the Monitoring and Evaluation policy of the GEF and UNIDO, follow-up studies like Country Portfolio Evaluations and Thematic Evaluations can be initiated and conducted. All project partners and contractors are obliged to (i) make available studies, reports and other documentation related to the project and (ii) facilitate interviews with staff involved in the project activities.

### Legal Context

The present project is governed by the provisions of the Standard Basic Cooperation Agreement between the Government of the Republic of Albania and UNIDO, signed and entered into force on 8 November 1991.

<sup>13</sup> It is anticipated that a gender expert will be recruited to monitor the gender-specific dimension of the project and provide guidance to maximize the impact.

**PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)**


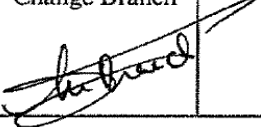
- A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT(S):**  
(Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this form. For SGP, use this [OFP endorsement letter](#)).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Prof. Dr. Pellumb Abeshi	GEF Operational Focal Point, General Director of the Environmental Policies	Ministry of Environment, Forest and Water Administration	05 / 28 / 2013

**B. GEF AGENCY(IES) CERTIFICATION**



This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Mr. Philippe Scholtès, Managing Director, Programme Development and Technical Cooperation Division (PTC),  UNIDO GEF Focal Point		07/29/2014	Mark Draeck, Industrial Development Officer, Energy & Climate Change Branch 	+43 1 260265317	m.draeck@unido.org

## ANNEX A: PROJECT RESULTS FRAMEWORK

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Assumptions
<b>Objective:</b> Increase the use of biomass in industrial energy consumption for productive use through demonstrated use of modern biomass technologies in SMEs in the olive oil industry	Number of new installed state of the art industrial biomass to energy equipment Direct CO <sub>2</sub> eq emission reductions Indirect CO <sub>2</sub> eq emission reductions	11 factories are using olive pomace as fuel commodity (four of them are using diesel as fuel). Existing boilers are 7-15 years old, low efficiency and their capacity has not been selected based on engineering calculations.  No driers, briquetters, pelletiser machine installed.  No related CO <sub>2</sub> emissions	New equipment installed at a minimum of 15 demonstration plants with an estimated total capacity of all new boilers equal to 1-1.2 MW <sub>th</sub> ; including approximately 15 efficient olive pomace boilers; 12 modern olive pomace driers; up to 7 briquetting machines; up to 10 pelletiser machines; and 6 crushed olive pit extractors.  Positive experience by over 80% of the clients, who have purchased all above mentioned equipments on the basis of problem free good quality products and after sale services. 53,000 tCO <sub>2</sub> eq direct emissions	Official import statistics and local supply side surveys  Ex-post project evaluations  Market surveys  GEF project tracking tool	Technical, economic and financial feasibility of technologies  Continuing support of the key stakeholders to meet the project objectives.  Implementation of project activities will foster investment in industrial biomass projects and reduce CO <sub>2</sub> emissions  Execution of planned activities with adequate resources mobilized
<b>Project Component 1 – Technology demonstrated for use of modern biomass technologies in industrial processes in Albania</b>					
<b>Outcome 1:</b> Increased utilisation of industrial biomass waste for energy proposed through technological innovation to trigger transformation of the olive oil industry	No. of new technologies introduced to olive oil industries (efficient boilers, briquetters, pelletisers, pit extractors, driers).  Volume of investment mobilised	None installed  None  None	A minimum of 15 projects  MUSD 1.2  53,000 tCO <sub>2</sub> eq	GEF project tracking tool  Financing partner data  Independent evaluation reports  Project reports	Beneficiary industries have co-finance to implement projects and there is the technical capacity to install the project.  Industrial

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Assumptions
	Tonnes of CO <sub>2</sub> eq avoided			Project website	associations engage with project
<b>Output 1.1:</b> A minimum of 15 business plans and feasibility studies developed for demonstration plants in SMEs using olive solid residues for the production of energy.	Guidelines developed for feasibility studies and business plan preparation Number of detailed feasibility studies and business plans Number of demonstration enterprises selected	Only general financial criteria used from different banks for all investment categories 15 simple energy audits and prefeasibility studies prepared. No business plans	Set of guidelines developed A minimum of 15 detailed feasibility studies and business plans completed	Project documents	Industry interested in developing biomass projects. Viable projects possible.
<b>Output 1.2:</b> Financing secured for a minimum of 15 demonstration projects % women	Financial closure achieved Amount of mobilised financing (USD)	No demonstration project with financial closure. No finance mobilised	A minimum of 15 demonstration projects reaching financial closure USD 1.1m mobilised	Project documents	Continued interest from Albanian banks. Commitment from industry owners.
<b>Output 1.3.</b> Demonstration plants built at a minimum of 15 olive oil industries with total capacity of 1 – 1.5 MW <sub>th</sub>	No. of demonstration plants Installed capacity Annual kWh saved or generated Annual GHG emissions reduced No. of case studies prepared	No demonstration projects 0 MW installed No kWh saved or generated No GHG reduced No case studies	A minimum of 15 demonstration projects installed and commissioned 1-1.5 MW <sub>th</sub> installed 53,000 tCO <sub>2</sub> eq reduced per year 15 case studies	Project documents	Continued interest from Albanian banks. Commitment from industry owners.
<b>Component 2: The enabling market and regulatory environment for biomass technology in industry created in Albania</b>					
<b>Outcome 2.1</b> Strengthened capacities on the application of modern biomass technologies for key actors in	No. of trained personnel No. of training sessions provided	No trained personnel No dedicated training sessions	200 trained people 5 training workshops 30 projects identified ready for finance	Project reports Survey of banks Official gov't	Continued interest from Albanian banks. Commitment from

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Assumptions
<p>the policy and industrial sectors in the olive oil and other sectors with high replication potential</p> <p><b>Outcome 2.2</b> Detailed assessment of the biomass potential for industrial uses and way forward for replication developed</p> <p><b>Outcome 2.3</b> Pipeline of project for replication developed and supportive regulatory environment created</p>	<p>No. of future industrial biomass projects identified</p> <p>No. of organisations applying to financing facility for industrial biomass projects</p> <p>Extent to which relevant policies and regulations are proposed and adopted</p>	<p>No projects identified (beyond 15 audits from PPG)</p> <p>No applications for finance</p> <p>No specific regulation / secondary legislation in place</p>	<p>30 projects apply for finance</p> <p>5 specific policies and regulations proposed to government</p>	<p>publications</p> <p>Project website</p>	<p>industry owners.</p> <p>Commitment from Government</p>
<p><b>Output 2.1:</b> 200 policy-makers, industry representatives and investors made aware and trained to understand the benefits of modern biomass and new technologies through 5 training workshops, dissemination of best practices and guidebooks for policy makers, project developers and investors on the procedures and development process of an industrial biomass project</p>	Training materials developed	No dedicated training material developed	Training material developed for different target audiences – two vocational training systems related to utilisation and installation of industrial-biomass energy technologies, one for financiers, one for industrial end users.	<p>Project reports</p> <p>Official Gov't publications</p> <p>Survey of trainees and associations</p> <p>Website</p>	<p>Support of the Albanian Association of Olive Oil Producers and other possible industrial associations</p> <p>Support of the key Government stakeholders, industry representatives; technologies suppliers</p>
	No. of best practice reports and project flyers developed	No best practice reports or flyers exist.	6 reports and flyers published (3 of each)		
	No. of guidebooks developed	No guidebook exists related to utilisation and installation of industrial-biomass energy technologies	2 guidebooks developed – one targeted at industrial units and energy users and one at financiers		
	No. of training workshops delivered	No workshops dedicated to industrial biomass	5 workshops		
	Total no. of trainees	0 trainees	200 trainees		
	% of women participants at workshops		20% women		
	No. of industrial trainees	Over 80% of the	150		

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Assumptions
	able to make a decision on installing biomass	end users consulted indicate that they have had no information about industrial-biomass energy technologies to make their decision.			
	No. of finance stakeholders trained % of women participants at training workshops	0	20 40% women		
	Awareness raising and marketing material available	Shortage of effective and good quality public awareness raising and marketing material.	Public awareness raising, marketing and training material developed and adapted for Albanian conditions and made available in printed and electronic format		
	Marketing campaign implemented	No marketing on biomass technologies	Availability of marketing material in ARDA and NANR websites and in national press		
	Awareness level of industry associations raised	No/little knowledge of biomass energy technologies	Industrial associations able to provide information on biomass technologies to their members		
	Website established	No website	Website established and regularly updated		
<b>Output 2.2:</b> Short and medium term potential for modern biomass applications for industrial uses assessed and the way forward for replication across sectors developed	Sectoral study on short and medium term potential for bio-energy applications assessed Strategy for way forward	Approx. Assessment of olive oil sector. No assessment of other sectors No future strategy Limited and scattered data available	Detailed market survey and assessment of short and medium term potential for each of relevant sectors (olive oil industries, wood processing, wine production, jam-fruit production) Strategy for replication developed	Project documents	



Project Strategy	Indicator	Baseline	Target	Sources of Verification	Assumptions
<b>Output 2.3:</b> Approximately 30 projects prepared for replication in facilities using modern biomass technologies	Standard questionnaire No. of energy audits, feasibility studies and business plans	No questionnaire No feasibility studies or business plans for replication	Questionnaire 30 audits, feasibility studies and business plans developed	Project documents	
<b>Output 2.4:</b> Tailored regulatory initiatives taken to ensure a sustainable expansion of biomass energy use across industrial sectors	Specific targets for the heat produced by industrial-biomass energy technologies by 2020 proposed.	No targets for heat by industrial biomass energy technologies	Specific targets for the heat produced by industrial-biomass energy technologies by 2020 proposed.	Project reports Official Gov't publications	Support of the key Government stakeholders.
	Amendments to the building code and building law to encourage the installation of industrial-biomass energy technologies when renovating proposed (including for public buildings)	No clauses in building codes or laws to ensure use of industrial biomass energy technologies at renovation	Amendments to the building code and building law to encourage the installation of industrial-biomass energy technologies when renovating proposed		
	Tax exemptions on imported industrial-biomass energy technologies equipment and materials proposed	No tax exemptions in place	Tax exemptions on imported industrial-biomass energy technologies equipment and materials proposed		
	Decree to set up an industrial-biomass energy technologies quality control system corresponding (to the extent feasible) to the relevant EU regulations established and systems in place	No decree	Decree established on industrial-biomass energy technologies quality control system		
	Proposals for Guarantee of Origin scheme and its operational framework	No Guarantee of Origin scheme in place	Proposals for Guarantee of Origin scheme developed and consulted with stakeholders Proposals for operational framework developed		

**ANNEX B: RESPONSES TO PROJECT REVIEWS** (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Comments were addressed at the PIF stage. A detailed M&E plan and budget is presented in the CEO Endorsement as requested. No further comments were received.

**ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS<sup>14</sup>**

A. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF: <b>50,000</b>			
<i><b>Project Preparation Activities Implemented</b></i>	<i><b>GEF/LDCF/SCCF/NPIF Amount (\$)</b></i>		
	<i><b>Budgeted Amount</b></i>	<i><b>Amount Spent To date</b></i>	<i><b>Amount Committed</b></i>
National subcontractor	45,000	45,000	
Work Package 1: Baseline project and preparation of Technology Demonstration (Project Component 1)			
Work Package 2: Financial specifications for the pilot technology demonstrations (On Project Component 1)			
Work Package 3: Creation of the Enabling environment: Policy and capacity building (On Project Component 2)			
Work Package 4: Stakeholder consultation and capacity building needs			
Work Package 5: Completion of CEO Approval document			
International expert	5,000	5,000	
Technical support in development and validation of CEO Approval Document			
<b>Total</b>	<b>50,000</b>	<b>50,000</b>	<b>0</b>

**ANNEX D: CALENDAR OF EXPECTED REFLows (IF NON-GRANT INSTRUMENT IS USED)**

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/NPIF Trust Fund or to your Agency (and/or revolving fund that will be set up)

No reflows are expected.

**ANNEX E: TRACKING TOOL FOR CLIMATE CHANGE MITIGATION PROJECTS**

See separate excel file with file name “Annex E \_GEF CC Mitigation Tracking Tool.xls”

<sup>14</sup> If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

**ANNEX F1: BUDGET SHEET (GEF FUNDING)**

COMPONENTS	GEF FINANCING	GEF DISBURSEMENT		
		YEAR 1	YEAR 2	YEAR 3
COMPONENT 1. TECHNOLOGY DEMONSTRATED FOR USE OF MODERN BIOMASS TECHNOLOGIES IN INDUSTRIAL PROCESSES IN ALBANIA				
1.1 A MINIMUM OF 15 BUSINESS PLANS AND FEASIBILITY STUDIES DEVELOPED FOR DEMONSTRATION PLANTS IN SMES USING OLIVE SOLID RESIDUES FOR THE PRODUCTION OF ENERGY	52,500	52,500	0	0
1.2 FINANCING SECURED FOR 15 DEMONSTRATION PLANTS	40,000	40,000	0	0
1.3 DEMONSTRATION PLANTS BUILT AT 15 OLIVE OIL INDUSTRIES WITH AN ESTIMATED TOTAL CAPACITY OF 1- 1.5 MWTH	397,500	278,250	119,250	0
<b><i>SUBTOTAL</i></b>	<b><i>490,000</i></b>	<b><i>370,750</i></b>	<b><i>119,250</i></b>	<b><i>0</i></b>
COMPONENT 2. THE ENABLING MARKET AND REGULATORY ENVIRONMENT FOR BIOMASS TECHNOLOGY IN INDUSTRY CREATED IN ALBANIA				
2.1 200 POLICY-MAKERS, INDUSTRY REPRESENTATIVES AND INVESTORS MADE AWARE AND TRAINED TO UNDERSTAND THE BENEFITS OF MODERN BIOMASS AND NEW TECHNOLOGIES THROUGH 5 TRAINING WORKSHOPS, DISSEMINATION OF BEST PRACTICES AND GUIDEBOOKS FOR POLICY MAKERS, PROJECT DEVELOPERS AND INVESTORS ON THE PROCEDURES AND DEVELOPMENT PROCESS OF AN INDUSTRIAL BIOMASS PROJECT	95,250	31,750	31,750	31,750
2.2 SHORT- AND MEDIUM-TERM POTENTIAL FOR MODERN BIOMASS APPLICATIONS FOR INDUSTRIAL USES ASSESSED, AND THE WAY FORWARD FOR REPLICATION ACROSS SECTORS DEVELOPED	67,000	20,100	46,900	
2.3. APPROXIMATELY 30 PROJECTS PREPARED FOR REPLICATION IN FACILITIES USING MODERN BIOMASS TECHNOLOGIES	65,000		65,000	
2.4. TAILORED POLICY ACTIONS TAKEN TO ENSURE A SUSTAINABLE EXPANSION OF BIOMASS ENERGY USE ACROSS INDUSTRIAL SECTORS	82,750	27,583	27,583	27,584
<b><i>SUBTOTAL</i></b>	<b><i>310,000</i></b>	<b><i>79,433</i></b>	<b><i>171,233</i></b>	<b><i>59,334</i></b>
COMPONENT 3. MONITORING AND EVALUATION AND KNOWLEDGE MANAGEMENT				
3.1 FINAL EVALUATION CARRIED OUT; PROJECT'S PROGRESS ASSESSED, DOCUMENTED AND RECOMMENDED ACTIONS FORMULATED KNOWLEDGE GAINED SHARED WITH PROJECT PARTNERS	45,000	0	15,000	30,000
<b><i>SUBTOTAL</i></b>	<b><i>45,000</i></b>	<b><i>0</i></b>	<b><i>15,000</i></b>	<b><i>30,000</i></b>
SUBTOTAL	845,000	450,183	305,483	89,334
PROJECT MANAGEMENT	82,000	27,333	27,333	27,334
<b>TOTAL</b>	<b>927,000</b>	<b>477,516</b>	<b>332,816</b>	<b>116,668</b>

## ANNEX F2: BUDGET SHEET (COFINANCING)

PROPOSED CO-FINANCING BUDGET*					
	CO-FINANCING BUDGET COMPONENT 1				
COMPONENT 1: TECHNOLOGY DEMONSTRATED FOR USE OF MODERN BIOMASS TECHNOLOGIES IN INDUSTRIAL PROCESSES IN ALBANIA	GOA	PRIVATE	UNIDO	BANKS	OUTCOME TOTAL
OUTCOME 1.1 INCREASED UTILISATION OF INDUSTRIAL BIOMASS WASTE FOR ENERGY PURPOSES THROUGH TECHNOLOGICAL INNOVATION TO TRIGGER TRANSFORMATION OF THE OLIVE OIL INDUSTRY	575,000	225,000		1,650,000	2,450,000
<b>TOTAL COMPONENT 1</b>	575,000	225,000		1,650,000	2,450,000
	CO-FINANCING BUDGET COMPONENT 2				
COMPONENT 2: THE ENABLING MARKET AND REGULATORY ENVIRONMENT FOR BIOMASS TECHNOLOGY IN INDUSTRY CREATED IN ALBANIA	GOA	PRIVATE	UNIDO	BANKS	OUTCOME TOTAL
OUTCOME 2.1 STRENGTHENED CAPACITIES ON THE APPLICATION OF MODERN BIOMASS TECHNOLOGIES FOR KEY ACTORS IN THE POLICY AND INDUSTRIAL SECTORS IN THE OLIVE OIL AND OTHER SECTORS WITH HIGH REPLICATION POTENTIAL	378,000			1,172,000	1,550,000
OUTCOME 2.2 DETAILED ASSESSMENT OF THE BIOMASS POTENTIAL FOR INDUSTRIAL USES					
OUTCOME 2.3 PIPELINE OF PROJECT FOR REPLICATION DEVELOPED AND SUPPORTIVE REGULATORY ENVIRONMENT CREATED					
<b>TOTAL COMPONENT 2</b>	378,000			1,172,000	1,550,000
	CO-FINANCING BUDGET M&E				
COMPONENT 3: M&E	GOA	PRIVATE	UNIDO	BANKS	OUTCOME TOTAL
OUTCOME 3.1 PROJECT'S PROGRESS TOWARDS GOALS CONFIRMED AND/OR NECESSARY ADJUSTMENTS MADE	80,000		100,000		180,000
<b>TOTAL COMPONENT 3</b>	80,000		100,000		180,000
	CO-FINANCING BUDGET PROJECT MANAGEMENT				
PROJECT MANAGEMENT	GOA	PRIVATE	UNIDO	BANKS	OUTCOME TOTAL
PROJECT MANAGEMENT	327,000				327,000
<b>TOTAL PROJECT MANAGEMENT</b>	327,000				327,000
* COFINANCING MAY VARY PER COMPONENT AND PER SOURCE DURING PROJECT IMPLEMENTATION					<b>TOTAL: 4,507,000</b>

## ANNEX G: ESTIMATE OF ENERGY SAVINGS AND GHG EMISSION REDUCTIONS

### Direct emission reductions

Direct emission reductions within this project result from the investment in a minimum of 15 demonstration projects and in direct assistance in a further 30 replication or scale-up projects. These projects will be installed and commissioned during the project's 3 year implementation phase resulting in direct GHG emission reductions. For each of these projects an economic lifetime of 20 years is assumed. For the 15 demonstration projects this results in total direct emission reductions of 53,000 tonnes of CO<sub>2</sub> equivalent (tCO<sub>2</sub>eq) over the lifetime of the investments, and for the 30 replication projects this results in double this figure with a further 106,000 tCO<sub>2</sub>eq. In the non-GEF base case these energy needs would be satisfied by diesel with an emission factor of 2.66 kg CO<sub>2</sub>/litre. This takes into account the use of energy by the factory as well as the use of the pellets or briquettes at by end customer. The following table summarises the emission reductions associated with the demonstration projects.

Olive oil industries Enterprise ID	Boiler	Drier	Briquetter / Pelletiser	Separator	GHG over Lifetime (tCO <sub>2</sub> eq)
1	1	1	1		2,187.44
2	1	1	1		3,843.57
3	1	1			4,047.62
4	1	1	1		4,945.95
5	1	1	1		2,329.75
6		1		1	3,063.48
7	1		1		7,046.01
8	1	1	1		965.04
9	1			1	2,721.39
10		1	1	1	3,488.96
11	1		1	1	2,069.32
12	1	1	1		3,780.53
13	1		1		4,282.11
14	1	1	1		4,291.10
15		1	1		4,254.84
<b>Total GEF</b>	<b>11</b>	<b>12</b>	<b>12</b>	<b>4</b>	<b>53317.088</b>

### Direct post-project emission reductions

Although the project will facilitate the financing of new biomass to energy projects beyond the implementation phase, this is not expected to use GEF funding which would be used during the project implementation phase only. Therefore as a conservative assumption, no direct post-project greenhouse gas emission reductions are claimed.

### Indirect emissions reductions

The project is expected to catalyse significant further investment in biomass to energy technologies due to its policy, technical and capacity building activities that are designed to address the current barriers to investment. These are likely not only in the olive oil industry but also in other industries, resulting in indirect emissions reductions. Using the GEF bottom-up methodology, indirect emission reductions attributable to the project are expected to be 318,000 tCO<sub>2</sub>eq. This figure assumes a conservative replication factor of 3 (GEF uses 3 for a market transformation initiative and 4 where a credit guarantee is introduced).

Using the GEF top-down methodology, indirect emission reductions attributable to the project are estimated at 240,000 tCO<sub>2</sub>eq. This figure assumes that total technological and economic potential for GHG emission reductions in this area over the post-project 10 years is 400,000 tCO<sub>2</sub>eq, with a project causality factor of 60 %, which takes into account the influence of the related existing government initiatives<sup>15</sup>.

The range of indirect CO<sub>2</sub> emission reductions is 240,000 – 318,000 tCO<sub>2</sub>eq.

<sup>15</sup> It is expected that post – project about 10 projects would be installed annually in Albania. Current projections are zero. The emission reductions due to these installations would equal approximately 4000 tCO<sub>2</sub>eq per project.

## ANNEX H: WORK PLAN

ANNEX 11: WORK PLAN

Breakdown of time for project activities		Year 1												Year 2												Year 3												
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Project set up and management																																						
Project management	Finalise institutional set-up and relationships																																					
	Set out roles and responsibilities																																					
	Establish a Project Management Unit/Office																																					
	Recruit project manager																																					
	Establish a Project Steering Committee																																					
	Prepare Terms of Reference for key experts																																					
	Prepare detailed work plan																																					
	Day-to-day coordination, management and monitoring of all project activities																																					
Component 1 Technology demonstrated for use of modern biomass technologies in industrial processes in Albania																																						
1.1.1 A minimum of 15 business plans for demonstration plants in SMEs using olive solid residues for the production of energy	1.1.1.1 Selection of demonstration enterprises																																					
	Development of eligibility criteria for selection of demonstration enterprises																																					
	Generating expressions of interest from potential beneficiaries																																					
	Selection of eligible enterprises																																					
	1.1.1.2 Preparation of guidelines for detailed business plans and feasibility studies																																					
	1.1.1.3 Development of a minimum of 15 detailed feasibility studies and business plans on the use of olive solid residues for energy																																					
Output 1.1.1																																						
1.1.2 Financing secured for a minimum of demonstration plants	1.1.2.1 Due diligence guidelines																																					
	1.1.2.2 Allocation of grant assistance to enterprises																																					
	1.1.2.3 Assistance provided to enterprises in securing finance for the demonstration projects																																					
Output 1.1.2																																						
1.1.3 Demonstration plants built at 15 olive oil industries with an estimated total capacity of at least 1-1,5 kW <sub>m</sub>	1.1.3.1 Installation and commissioning of demonstration projects																																					
	1.1.3.2 Performance Monitoring and analysis of installed projects; documentation of results of demonstration projects and preparation of case studies																																					
Output 1.1.3																																						
Total Component 1																																						





## OVERVIEW OF TECHNICAL ANNEXES

**Annex 1: Summary of Energy Audits and Pre-Feasibility Studies**

**Annex 2: RES Development in Albania and Role of Biomass in General and Olive Pomace (Seeds) in Particular**

**Annex 3: Olive Production Situation in Albania**

**Annex 4: Olive Oil Production Processes**

**Annex 5: Technologies for treating/using olive residues (group of technologies)**

**Annex 6: Draft Terms of Reference for key project staff**

**Annex 7: Energy Audits and Pre-Feasibility Reports (*full report - see separate pdf*)**

**Annex 8: Summary of Stakeholder Consultation Workshop (19 Feb 2014, Tirana) (*see separate pdf*)**

**Annex 9: Summary of Validation Workshop (19 June 2014, Tirana) (*see separate pdf*)**

