

File reference:
Project:

F/MAROCCOparadise2012-JMF-0003
Paradise Morocco, District of Midelt – Sustainable Community Initiative

PARADISE MOROCCO “Midelt”
SUSTAINABLE COMMUNITY INITIATIVE
F/MAROCCOparadise2012-JMF-0003

HOLDER	JOSEPHINE MEDICAL FOUNDATION
	Mrs Mina ICHOUA
Phone/Fax/Cell	+33.665.44.80.00 - +33.493.64.98.39
Address	Villa Dial Baba 1071, chemin du Retenaou 06220 – Vallauris (FRANCE)
Passport # / Country	09PT88092 - FRENCH
Expiration Date	06.12.2019
E-Mail Address	mina-ichoua@wanadoo.fr or m.ichoua@jm-foundation.com
Project Name	Paradise Morocco - Midelt (100.000 Ha)
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Project Location/Country	MOROCCO: Midelt
Number Of Employees	50,000 Employees
Financial Advisor/Phone	Nicolas PERRUCHOT
	+33.679.32.79.62
Funding Amount / USD	Two Billion six Hundred seventy four Million US Dollars
	US \$ 2.674.000,000.00

Paradise Renewables Inc. and Josephine Medical Foundation with the approbation of the Government of Morocco have agreed to build, own and operate a showcase “**Paradise Morocco, District of Midelt**” Sustainable Community Initiative” project that will demonstrate the integration of the world's most advanced sustainable high-tech agroforestry, material recycling and biomass conversion technologies to create an urgently needed paradigm shift in how the people of Morocco view community waste management, and enhance the communities connection with the natural environment and each other through expansion of urban green space, green roofs, living walls, community urban farming, and the creation of cooperative bio refineries that product a wide range of foods, green fuels, power and products. Biomass, and municipal and industrial organic waste can now be considered “crude oil equivalents” that can enable Morocco to achieve both 100% recycling, and carbon neutral energy and fuel independence when integrating the vast solar and sustainable biomass resources the country possesses as its natural resource base.



DESERTEC illustrated example of an Intergrated Solar Gasification, Glasshousse Nurserie and Sustainable High-Tech Agroforestry Plantation Concept

To create a broadly inclusive workforce and future generations of green industry and sustainable high-tech agroforestry innovators, the project will include a “Paradise Morocco Botanical Gardens” and a “Paradise Morocco Green Technology and Sustainable Agroforestry Innovation Center”, which will be themed and integrated with the unit operations. Distance learning, hands-on education and green business incubator programs will be an integral part of the innovation center. Research and development of next generation sustainable high-tech agroforestry, clean technology and green infrastructure solutions will continue to elevate and accelerate the quality and effectiveness of educational training programs.

The Government of Morocco has agreed to adopt the United Nations Environmental Program “Green Cities Declaration” as part of its national master plan to demonstrate its commitment to address the critical environmental issues of energy, waste reduction, urban design, urban nature, transportation, environmental health and water as cited in the Urban Environmental Accords. The Paradise Morocco Sustainable Country showcase project will incorporate a large-scale community beautification and industrial zone green transformation initiative that will involve the planting of native flowering trees and plants that yield high-value lumber, food, and botanical extracts.

1. PROJECT MISSION, SCOPE AND OBJECTIVES

The Paradise Morocco Green Country and Sustainable Community project partners share a common mission to create a showcase project that demonstrates the world's most advanced green infrastructure technologies and sustainable high-tech agroforestry practices. The scope of the project will include:

- 1 - 100% Zero Waste to Landfill via Single Stream Recycling and Community Cooperatives.
- 2 - Nationwide community-by-community cooperative initiative to expand high-tech urban farming, rooftop gardens, community gardens, and sustainable agroforestry plantations
- 3 - Paradise Solar Glasshouse Growing Systems – Energy Harvesting Solar Window Panel System
- 4 - Integrated Multi-level Tissue Culture Propagation and Advanced Hydroponic Growing Systems
- 5 - Bioproduct Processing Center – Superfood packaging, novel green bioproducts, and medicinal, nutraceutical, and aromatic botanical extracts
- 6 - Solar Powered Biomass Conversion Facility – Waste to Green Fuels, Power and
- 7 - Syngas-To-Liquid Fuel and Chemical Systems
- 8 - Building Material Manufacturing Center (Waste Recovery to Building Materials)

All facilities should be located at waste transfer stations, landfills and industrial zones to ensure the best logistics. As much as possible, facilities will be built on-site from recycled materials and incorporate green technologies that enhance workplace safety, efficiency and effectiveness. The total project capitalization for Paradise Morocco Green Country is projected to be at approximately \$2,674,000,000 USD (\$2.674B) and generate approximately 50,000 new clean tech, agroforestry and community green jobs.

All Paradise Morocco Sustainable Communities Initiative project partners share a common mission to create a showcase project that demonstrates the world's most advanced green infrastructure technologies and sustainable high-tech agroforestry practices.



The Government of Morocco will provide all land permits as needed to build, own and operate the proposed Integrated Bio-refinery, Recycling and Sustainable High-Tech Agroforestry Plantations. The project's primary objective is to ensure that the “**Paradise Morocco Integrated Bio-refinery**” represents the world's largest and most advanced and commercially proven recycling and municipal organic waste/biomass conversion facility, and associated bio-char based sustainable high-tech agroforestry initiative. At full capacity the project will convert 10,000 metric tons per day (hereinafter “MTPD”) of municipal and industrial waste, and biomass feedstocks into 250 MW of 24/7 base-load electric power and 1,500,000 Metric Tons per year of ultra-low sulfur synthetic diesel.

The integrated bio-refinery, recycling facilities, greenhouses and sustainable high-tech agroforestry plantations will be completed in phases. Phase I will involve the construction and operation of a 10 hectare showcase and training greenhouse nursery and propagation center, 1,000 hectare of sustainable high-tech agroforestry

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plantations, 1 MW concentrated solar power plant, and an Integrated Bio-refinery that will convert 300 MTPD of post-recycling municipal organic waste and biomass into base-load electric power, and ultra-low sulfur synthetic diesel. Phase I will also include a 5 MTPD mobile biomass to syn-diesel demonstration system that is capable of converting any community biomass, even from extreme toxic waste spills or disaster relief sites. This system will provide an excellent tool for kindergarden to university earth science, applied science and green science inspiration, along with integrated dispatch-able solar/biomass mobile power systems.

Phase II and Phase III will include the expansion of the Integrated Bio-refinery processing capacity, and sustainable high-tech agroforestry plantations as needed to meet Paradise Morocco's contracted product off-take customers. In addition to total building integrated photovoltaic systems, we incorporate the latest in energy harvesting building products. In addition, the land dedicated to the Concentrated Solar Power systems will also be used for out-planting shade loving agroforestry crops to provide additional community garden space, as well as feedstocks bio-product processing centers and solar/biomass to liquid fuel to ensure 24/7 base-load power as needed to supplement the CSP systems during non-daylight hours and periods of cloudy weather.

Project Development Timeline and Capacity Expansion:

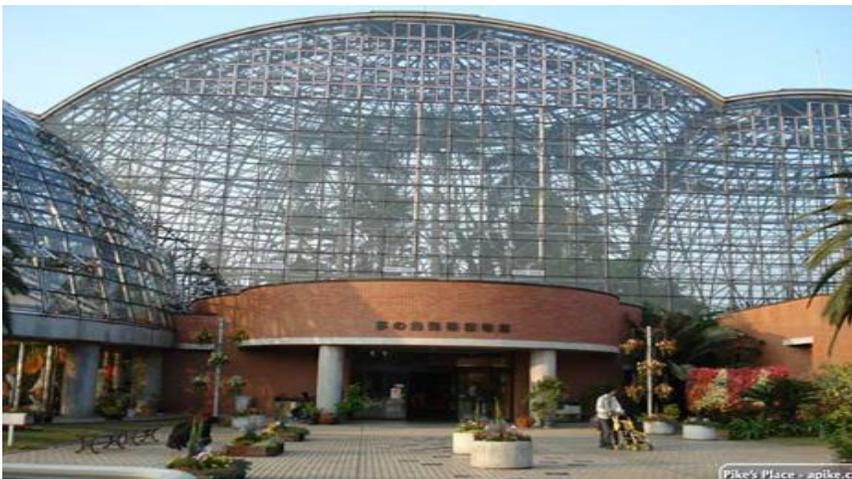
PHASE I:	4 to 12 Months	1,000 Hectare in Sustainable High-Tech Agroforestry Plantations 10 Hectare Glasshouse Nurseries Bio-product Processing Facility and Material Recycling Facility 1 MW Concentrated Solar Power Plant 300 MTPD Solar Flash Pyrolysis/Biomass Gasification System 5 MTPD Mobile Gasification System
PHASE II:	12 to 24 Months	10,000 Hectare in Sustainable High-Tech Agroforestry Plantations 100 Hectare Glasshouse Nurseries Expansion of Bio-product Processing Facility and Material Recycling Facility 25 MW Concentrated Solar Power Plant 1,500 MTPD Waste and Biomass to Diesel Fuel and Chemical Systems
PHASE III:	24 to 48 Months	100,000 Hectare in Sustainable High-Tech Agroforestry Plantations 500 Hectare Glasshouse Nurseries 250 MW Concentrated Solar Power Plant 10,000 MTPD Solar/Biomass Conversion System Building Product Manufacturing Center

The Paradise Morocco Green Country Project will include a “**Paradise Morocco Botanical Gardens**” and “**Paradise Morocco Green Technology and Sustainable Agroforestry Innovation Center**” to provide distance learning, hands-on education and green business incubator programs. The Paradise Morocco Green Technology and Sustainable Agroforestry Innovation Center, will be an integral part of ongoing efforts to create a broadly inclusive workforce and future generations of green industry and agroforestry innovators. The training center will

collaborate with local schools and vocational programs as well as the world's leading educational centers to advance the fields of sustainable high-tech agroforestry, and earth and applied sciences and green infrastructure innovation, especially for arid and drought prone climates.

Project Objectives and Benefits:

- *To achieve energy and fuel independence for Morocco.*
- *To establish local re-manufacturing facilities of recyclable commodities from urban, industrial, and construction and demolition waste for the production of building and consumer products using modern mini-mill re-manufacturing of glass, metals, wood, concrete and other valuable.*
- *To ensure maximum economic growth and up to 50,000 new Green Jobs for Morocco.*
- *To demonstrate a zero waste and carbon negative technology platform by implementing bio-char based sustainable agroforestry, single-stream recycling, the reclamation of landfill and toxic waste disposal sites, and eliminating point-source pollution discharges to the waterways in Morocco .*
- *To showcase a “Green City” technology platform that meets the United Nations Urban Environmental Accords and Green Cities Declaration, and can be rapidly replicated throughout Morocco, Africa and communities worldwide.*
- *To show global leadership by exceeding all Morocco, and international environmental regulations, and green city or sustainable community standards for waste diversion, open space and a connection to a healthy natural environment.*
- *To have the Government of Morocco adopt the United Nations “**Green Cities Declaration**” as part of its country master-plan to address the seven (7) universal issues of energy, waste reduction, urban nature, urban design, environmental health, transportation and water, as cited in the UN Environmental Programme's Urban Environmental Accords.*
- *To implement a broad-based program for human, technical and financial capacity building through the establishment of the “Paradise Morocco Botanical Gardens” and the “Paradise Morocco in the District of Midelt, Green Technology and Sustainable Agroforestry Center”.*



The Paradise Morocco Green Technology and Sustainable Agroforestry Innovation Center will be an integral part of ongoing efforts to create a broadly inclusive workforce

2. GREEN INFRASTRUCTURE & TECHNOLOGY PLATFORM

Each project begins with the establishment of a glasshouse nursery and agroforestry bio-product processing center. Glasshouse nurseries will propagate seedlings for supply to the Company's sustainable agroforestry plantations. Harvested crops will be delivered to bio-product processing centers for the production of high profit margin super-foods, edible oils, protein powders, and botanical extracts. Biomass residues from the bio-product processing centers will be used as feedstock for conversion into green fuels, chemicals and electric power.

HIGH-TECH SUSTAINABLE AGROFORESTRY PLANTATIONS

Our sustainable agroforestry plantation strategy is focused on the intercropping of elite and endangered native trees and crops, and fast growing non-invasive trees such as Paulownia and Moringa hybrids that can supply reliable high yielding multi-purpose harvests. Paulownia and Moringa hybrids are ideal for wasteland restoration in arid and drought prone regions with poor soil because they require very little water, tolerate high salinity, and are nitrogen fixing and soil building.

Moringa plantation in Senegal in ultra-high density at 1 million trees per hectare.



Morocco Soil Carbon Initiative – Africa Wide Bio-char Soil Restoration for Agroforestry

Biochar based farming is a proven method for soil restoration and permanent carbon sequestration. It was discovered that biochar found in ancient farm plots of the Amazon basin region was used by Native Americans between 2,000 to 6,000 years ago to make a highly productive soil called "[Terra Preta](#)" (translated "black earth"). A global biochar based agroforestry initiative is the most logical solution to balancing global carbon and nutrient cycles, since biochar removes net carbon from the atmosphere. As plants grow they remove CO₂ from the air to build biomass, but when plants die they return both CO₂ and CH₄ (methane) to the atmosphere as they decompose. When biomass is heated without oxygen (i.e., "pyrolyzed") it produces charcoal, and when buried in the ground it is referred to as "biochar". Over 40% of the total carbon from waste biomass is retained in biochar, and can be sequestered in the soil for thousands of years. Biochar also greatly reduces soil respiration of CH₄ (methane) and NO_x (nitrous oxide), which is especially important since CH₄ is 21 times, and nitrous oxide is 310 times more destructive than CO₂ as greenhouse gases. The carbon in 1 ton of biochar is equivalent to 3 to 3.5 tons of CO₂. Modern biochar trials have proven to significantly increase crop yields by up to 800% depending on the original quality of the soil.

AGROFORESTRY BIO-PRODUCT PROCESSING CENTERS

Bio-product processing centers will offer one of the fastest revenue streams and highest profit margins of all bio-refinery unit operations. The bio-product processing center unit operations include; glasshouse nurseries that will be separated into tissue culture propagation, and ultra-high density multi-level crop cultivation zones, as well as supercritical CO2 extraction systems. The Company's processing technologies are completely organic and preserve nearly all of the plants most delicate micronutrients and complex co-vitamins that can be easily damaged by conventional high-temperature hexane solvent extraction, pasteurization, distillation, or high-impact mechanical processes. No GMO crops, or toxic herbicides and pesticides will be used in agroforestry operations.

Our integration of bioproduct processing centers generates one of the fastest revenue streams and highest profit margins of all biorefinery unit operations



Supercritical CO2 Botanical Extraction of Pharmaceuticals and Nutraceuticals

CO2 Supercritical Fluid Extraction is a breakthrough process for producing the purest and highest value, contaminant free botanical extracts for use in the pharmaceutical, nutraceutical, cosmeceutical and superfood industries. Under high pressure and low temperature beverage grade CO2 can selectively extract high-value medicines, nutrients, essential oils, aromas and flavorings without decomposing salts, amino acids, peptides, aromas or other delicate nutritional compounds in plant materials.

Controlled Climate Solar Harvesting Glasshouse Food Cultivation

Paradise Renewables has developed the most advanced glasshouse growing system available today. CO2 charged solar and biomass powered glasshouse nurseries will propagate native and endangered plant species, as well as the fastest growing, non-invasive trees and plants that offer high-value foods and botanical extracts. Dutch style glasshouse systems have proven to achieve yields of up to 20x that of field grown crops.



Tissue Culture Protocol, Vertical Aeroponic Growing Tray System

The most advanced tissue culture propagation is integrated with multi-level vertical aeroponic growing tray systems for ultra-high density plant cultivation. To further optimize plant growth rates and harvest yields, daylight channeling and supplemental lighting systems will be used as growing hour extenders for cloudy days and evening hours. Tissue culture propagation is the fastest and lowest cost method for rapidly establishing large-scale agroforestry plantations from elite or endangered plant species. Thousands of trees can be reproduced from a small amount of plant material when using tissue culture propagation.

Vertical hydroponic growing tray systems have proven to achieve yields of up to 20x that of field grown crops

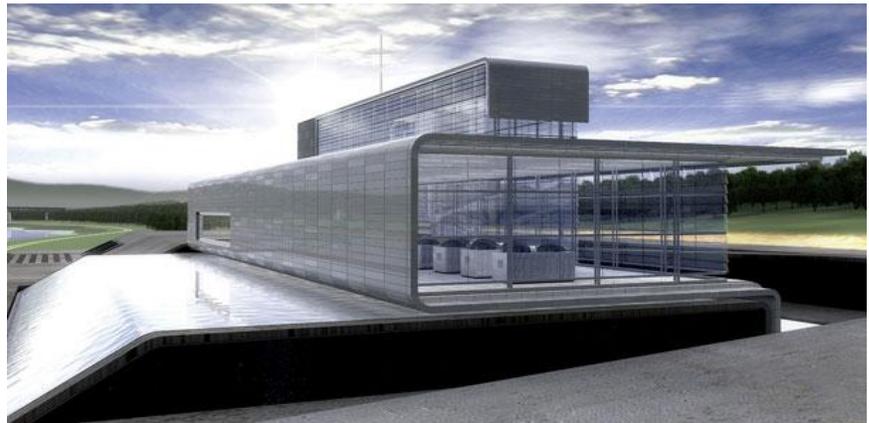


INTEGRATED BIO-REFINERY OPERATION

Our unique biomass conversion technology platform creates an urgently needed paradigm shift in how communities manage their waste and natural resources. Biomass, and municipal and industrial organic waste can now be considered “crude oil equivalents” that enable 100% recycling, and carbon neutral energy and fuel independence by converting waste streams and biomass into a wide-range of high-value green products. Our integration of bio-product processing centers and CO2 extraction systems helps to diversify the revenue streams and offers the highest and best use of agroforestry feedstocks by first extracting high-value carbohydrates,

proteins, oils, sugars, and lignin, prior to the final conversion into green fuels, chemicals and power.

Today's breakthrough energy harvesting building products and biomass conversion systems create a paradigm shift in energy production, sustainable agroforestry and waste management.

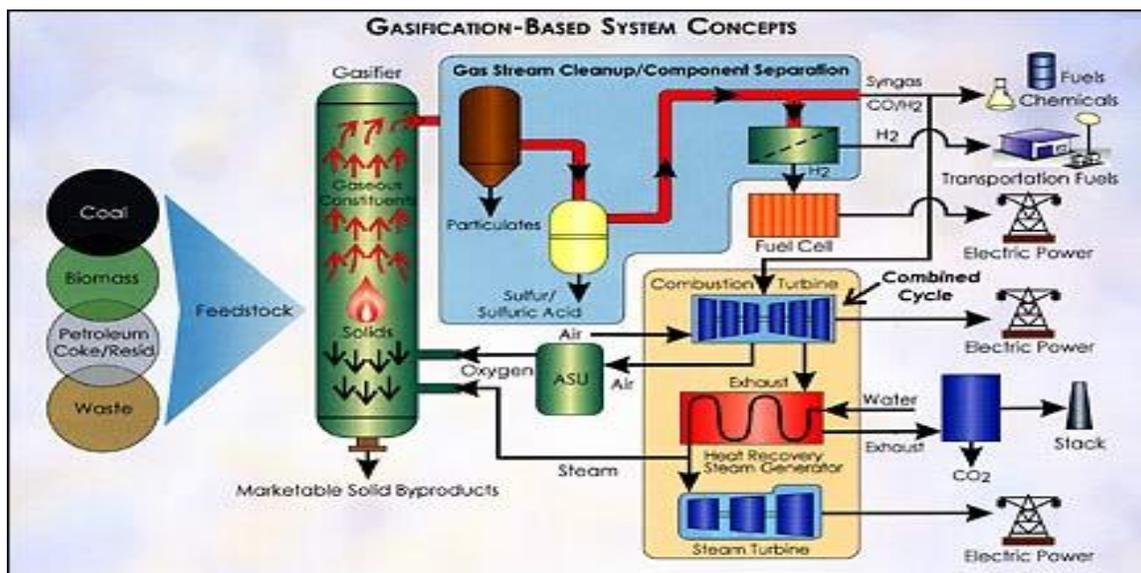


Single-Stream Recycling Facility

Most cities have very low recycling participation rates because the burden is now placed on residents and businesses to hand sort and separate their recyclable materials into multiple containers. Single-stream recycling eliminates the need for people to handle potentially bio-hazardous or toxic waste materials by using a single disposal container for placing all recyclables and waste materials together, thereby greatly improving the ease, efficiency and safety of curb-side collection, while substantially reducing collection program capital costs and operational expenses through the use of a single collection vehicle. The integrated bio-refinery process begins with the delivery of all municipal and industrial waste to the recycling facility tipping floor, where organic waste is mechanically separated and delivered by conveyor to the biomass conversion systems for the production of biochar, and a wide range of green fuels, chemicals and electric power. Recyclable materials are sorted and delivered to the mini-mill processing facility for conversion into building and consumer products.

Solar Powered Biomass Conversion

Paradise Renewables offers a technology platform that is capable of converting the widest spectrum of agroforestry crops, municipal and industrial organic waste, and stranded hydrocarbon feedstocks into a diverse range of products. The process begins by using concentrated solar power and waste heat to convert greenwaste and biomass feedstocks into green fuel, chemicals, power and building products.



A Heat Recovery Steam Generator (HRSG) will supply high-pressure super-heated steam to drive back-pressure turbines to produce electric power. Additional step-indexed HRSG systems with lower temperature phase change working fluids will be incorporated for water purification, and to ensure all sensible heat is utilized to optimize total plant efficiencies. Lower-temperature HRSG systems will provide for heating, ventilation, air-conditioning, and refrigeration (HVACR) that can be supplied to distributed networks. The lowest-grade waste heat from the process will be utilized for heating glasshouse nursery operations during evening hours. By balancing exothermal and endothermic processes, and through the use of cascading phase change bottoming cycles we achieve “total thermal integration”.

Gas-To-Liquid Fuel and Chemical Systems

Gas-to-liquid (GTL) production systems using Fischer-Tropsch synthesis, direct catalytic, and enzymatic fuel and chemical reforming systems are standard unit operations in the petrochemical industry and have a long history of commercial success. Although we can produce virtually any green fuel or chemical to meet our off-take customer's specifications, we strongly advocate the use of synthetic diesel and dim-ethyl ether (DME) for transportation fleets as they already meet all Morocco, USEPA, EU and other international standards and mandates for ultra-low sulfur fuels.

Wastewater Treatment and Desalination

To solve the interrelated problems of highly polluted waterways, desertification and food scarcity, a reliable source of clean water is essential. Desalination and purification of wastewater and brackish water into drinking and agricultural irrigation water requires a significant amount of energy, therefore we will utilize a portion of the waste heat from our solar gasification process for desalination or wastewater purification. Regions that experience persistent water shortages and droughts are often ideal for solar thermal systems. For village-scale and industrial wastewater purification, the Company will use activated carbon produced from the flash pyrolysis process to supply water filtration systems for our community partners.

Mini-Mill Smelting Systems

The re-manufacturing of recyclable commodities from urban, industrial, and construction and demolition waste for the production of building and consumer products is now economically feasible with the integration of UHT gasification systems and state-of-the-art induction heated mini-mill technologies. Mini-mill smelting is the most logical use of the large quantities of metal, glass and plastic that are now often land filled, or shipped to Asia as low-value commodities. The re-use and re-manufacturing of these recyclable commodities into basic building materials and consumer products for use within the local economy is the most viable solution for cities to achieve long-term resource sustainability. Minerals found in coal and petroleum sludges, as well as precious and rare earth metals used in batteries and electronic equipment can also be fully recovered into high-value products. The traditional barrier to developing this market has been the ultra-high temperatures required for smelting these materials, yet the Company's UHT technology platform is perfectly suited to overcoming this challenge.

CO2 Capture and Utilization

CO2 generated from the gasification of organic waste and biomass will be captured and used for charging the Company's glasshouse facilities to optimize plant growth rates, and in the production of high-value nutraceutical and pharmaceutical extracts from agroforestry crops. Carbon Molecular Sieve Membrane filters (CMSM) have major applications in the removal of carbon dioxide from poor quality landfill gas (LFG), biogas, stranded natural gas and synthetic natural gas produced from flash pyrolysis and gasification systems to make the gas suitable for use in power production systems, upgrading to pipeline quality, or for further reforming into liquid fuels and chemicals. After the CO2 is removed by CMSM filters and purified to beverage grade liquid CO2 there are a vast array of further downstream applications in various bio-refinery unit operations, including; as a nutrient feedstock to cultivate algae for super-foods, oleochemical reforming into bio-plastics, and for CO2 Supercritical Fluid Extraction (SCFE) of high-value botanical extracts, proteins and essential oils.

3. FINANCIALS

Investment Evaluation

According to the scope and dynamics of the Paradise Morocco Green Country project and with reference to other similar projects in terms of construction, equipment, architectural design and facility operational and agroforestry costs, we provide the following as a preliminary economic evaluation of the investment in the project:

Timing:

Land purchase, project development and program start-up	US\$	274.000.000,00
EPC, Plant and Equipment Acquisition/Deposits	US\$	720.000.000,00
Pre-shipment of Equipment	US\$	720.000.000,00
Commissioning	US\$	960.000.000,00