

## USIJI Uniform Reporting Document: Activities Implemented Jointly Under the Pilot Phase

### A. Description of the AIJ project

1. **Title of project:** Project *Salicornia*: Halophyte Cultivation in Sonora
2. **Host country:** Mexico
3. **Brief project description:**

Project *Salicornia* is Phase I of a two-phase project to cultivate a native halophyte (a salt-tolerant euphorb plant, *Salicornia bigelovii*) in a coastal desert region of northwest Mexico. Phase I is designed to research and demonstrate *Salicornia* cultivation on 30 hectares of coastal land. The estimated greenhouse gas (GHG) benefits of the project result from carbon accumulation and storage in the sandy soil. If Phase II is initiated, the cultivated crop could potentially serve as a valuable source of biomass material and food (cooking oil and fresh vegetable products), and could generate income for the local population.

4. **Participants:**

Name of Organization or Individual	Country
Genesis, S.A. de C.V. (a subsidiary of PDC)	Mexico
Planetary Design Corporation (PDC)	U.S.A.
Halophyte Enterprises, Inc (HEI—a subsidiary of PDC)	U.S.A.
Salt River Project (SRP)	U.S.A.
Econergy International Corporation (EIC)	U.S.A.

Item	
<b>Organization</b>	
Name of organization (original language) or Name of individual if unaffiliated with any organization	Genesis, S.A. de C.V.
Name of organization (English)	(Same as above)
Acronym (original language)	None
Acronym (English)	(Same as above)
Department	
Function(s) within the AIJ project activities	Administration
Street	Yañez 116 Norte
City	Hermosillo, Sonora
State	
Post code	CP 81390
Country	Mexico
Telephone	
Fax	
E-mail	<a href="mailto:Genesismx@hotmail.com">Genesismx@hotmail.com</a>
World Wide Web-URL address	
<b>Administrative Officer Responsible for the Project</b>	
Surname	Mota Urbina
First name, middle name	Carlos
Job title	Director General de Genetica y Sistemas de Ingenieria Solar S.A. de C.V.
Direct telephone	
Direct fax	
Direct e-mail	
<b>Contact Person for AIJ Activities (if different from the Administrative Officer)</b>	
Surname	Cota Hernández
First name, middle name	C.P.T. Alfonso
Job title	Director Financiero
Direct telephone	52-62-14 5667 or 14 5824
Direct fax	(Same as above)
Direct e-mail	

Item	
<b>Organization</b>	
Name of organization (original language) or Name of individual if unaffiliated with any organization	Planetary Design Corporation
Name of organization (English)	(Same as above)
Acronym (original language)	PDC
Acronym (English)	(Same as above)
Department	
Function(s) within the AIJ project activities	Technology development and coordination
Street	4500 North 32nd Street #100
City	Phoenix
State	Arizona
Post code	85018
Country	U.S.A.
Telephone	602-912-9887
Fax	602-912-0277
E-mail	<a href="mailto:info@seaphire.com">info@seaphire.com</a>
World Wide Web-URL address	
<b>Administrative Officer Responsible for the Project</b>	
Surname	Hodges
First name, middle name	Roy Malone
Job title	Chief Operating Officer
Direct telephone	602-912-9887
Direct fax	602-912-0277
Direct e-mail	<a href="mailto:rhodges@seaphire.com">rhodges@seaphire.com</a>
<b>Contact Person for AIJ Activities (if different from the Administrative Officer)</b>	
Surname	Platt
First name, middle name	Joseph B.
Job title	Ecologist
Direct telephone	602-912-9887
Direct fax	602-912-0277
Direct e-mail	<a href="mailto:jplatt@seaphire.com">jplatt@seaphire.com</a>

Item	
<b>Organization</b>	
Name of organization (original language) or Name of individual if unaffiliated with any organization	Halophyte Enterprises, Inc (a subsidiary of PDC)
Name of organization (English)	(Same as above)
Acronym (original language)	HEI
Acronym (English)	(Same as above)
Department	
Function(s) within the AIJ project activities	Financing
Street	4500 North 32nd Street, Suite 100
City	Phoenix
State	Arizona
Post code	85018
Country	U.S.A.
Telephone	
Fax	
E-mail	
World Wide Web-URL address	
<b>Administrative Officer Responsible for the Project</b>	
Surname	
First name, middle name	
Job title	
Direct telephone	
Direct fax	
Direct e-mail	info@seaphire.com
<b>Contact Person for AIJ Activities (if different from the Administrative Officer)</b>	
Surname	
First name, middle name	
Job title	
Direct telephone	
Direct fax	
Direct e-mail	

Item	
<b>Organization</b>	
Name of organization (original language) or Name of individual if unaffiliated with any organization	Salt River Project
Name of organization (English)	(Same as above)
Acronym (original language)	SRP
Acronym (English)	(Same as above)
Department	
Function(s) within the AIJ project activities	Financing
Street	P.O. Box 52025, Mail Station PAB #355
City	Phoenix
State	Arizona
Post code	85072-2025
Country	U.S.A.
Telephone	
Fax	
E-mail	
World Wide Web-URL address	
<b>Administrative Officer Responsible for the Project</b>	
Surname	Brown Maracas
First name, middle name	Kate
Job title	Manager, Environmental Affairs
Direct telephone	602-236-2045
Direct fax	602-236-3407
Direct e-mail	<a href="mailto:kbmaraca@srp.gov">kbmaraca@srp.gov</a>
<b>Contact Person for AIJ Activities (if different from the Administrative Officer)</b>	
Surname	(Same as above)
First name, middle name	
Job title	
Direct telephone	
Direct fax	
Direct e-mail	

Item	
<b>Organization</b>	
Name of organization (original language) or Name of individual if unaffiliated with any organization	Econergy International Corporation
Name of organization (English)	(Same as above)
Acronym (original language)	EIC
Acronym (English)	(Same as above)
Department	
Function(s) within the AIJ project activities	Technical and financial advisor
Street	1925 K Street, NW, Suite 230
City	Washington
State	District of Columbia
Post code	20006
Country	U.S.A.
Telephone	
Fax	
E-mail	
World Wide Web-URL address	
<b>Administrative Officer Responsible for the Project</b>	
Surname	Ashford
First name, middle name	Michael S.
Job title	Vice President
Direct telephone	202-822-4980
Direct fax	202-822-2986
Direct e-mail	
<b>Contact Person for AIJ Activities (if different from the Administrative Officer)</b>	
Surname	(Same as above)
First name, middle name	
Job title	
Direct telephone	
Direct fax	
Direct e-mail	

## 5. Description of AIJ project activities

Item	
<b>Type of Project</b>	
Sector(s)	Agriculture
Primary activity(ies)	<i>Salicornia</i> cultivation and crop management; technical analysis of soil carbon accumulation and commercial feasibility of <i>Salicornia</i> cultivation
<b>Project Location</b>	
Country	Mexico
Exact location (city, state, region)	About 400 yards from the coast, adjacent to the town of Bahia de Kino (Kino Bay) in Sonora
<b>Key Dates and Current Stage of Project</b>	
Project starting date (month/year)	April 1996 <sup>(a)</sup>
Project ending date (month/year)	October 2055 <sup>(b)</sup>
Project lifetime (years)	59 years, 7 months
Current stage of project	In progress
<b>General Project Description and Technical Data</b>	
<p>The project is Phase I of a two-phase project to cultivate <i>Salicornia bigelovii</i> in a coastal desert region of northwest Mexico. <i>Salicornia bigelovii</i> is a native halophyte, which can be irrigated with sea water and is ideally suited for cultivation in desert or near-desert, coastal regions.</p> <p>Phase I is designed to research and demonstrate <i>Salicornia</i> cultivation on 30 hectares of coastal land. The specific measures to reduce GHG emissions associated with Phase I of the project include development of a cost-effective process to cultivate <i>Salicornia</i> on a commercial basis, and optimization of agronomic methods for irrigation and harvesting. These measures will increase carbon storage in the soil at the 30 hectare site. Phase II, which is currently not part of this USIJI project, will develop a fully commercial 50,000 hectare farm to cultivate <i>Salicornia</i> for use in the production and commercial sale of biomass products and materials. If Phase II is initiated, the cultivated crop could potentially serve as a valuable source of cooking oil, fresh vegetable products, high-fiber biomass for particle board manufacturing, and biomass for power generation, and could provide income to the local population.</p>	
<p>(a) Although the project was accepted by USIJI in 1997, carbon accounting began with the 1996 growing season because, during that season, EIC and HEI conducted substantial technical market and business analysis in anticipation of the development of a potential USIJI project.</p>	
<p>(b) Carbon accounting will end with the end of the growing season in 2055.</p>	

**6. Cost**

**(a) Explanation of methodology for calculating cost data**

<b>Methodology for Calculating Cost Data</b>
This information is not yet available.

**(b) Cost data–Project development**

This information is not yet available.

**(c) Cost data–Project implementation**

This information is not yet available.

**7. Monitoring and verification of AIJ project activities and results**

<b>Item</b>	
Party(ies) that will be monitoring project activities	Genesis and HEI, with technical support from EIC and in coordination with SRP.
Party(ies) that will be externally verifying project results	This information is not yet available.
Date when the monitoring plan became (or will become) operational (month/year)	This information is not yet available.
Types of data that will be collected	Soil carbon content and density of belowground biomass, annual quantity of biomass harvested, annual production and carbon content of long-lived products, average decay rate of long-lived products, fossil fuel consumption.
<b>Description of Monitoring and Verification Activities and Schedule for Implementation</b>	
<p>Monitoring will be conducted by Genesis and HEI with technical support from EIC and in coordination with SRP. The soil carbon stocks of below-ground biomass will be monitored every 2-3 years over the lifetime of the project.</p> <p>Annual biomass harvests will be monitored based on annual project harvest records. Fuel and electricity consumption used to operate machinery and irrigation pumping will also be monitored.</p> <p>The proposal states that the participants intend to identify, in consultation with Mexican and U.S. authorities, appropriate independent entities to conduct external verification. Verification will be conducted on an annual basis using data collected by the project operators.</p>	



**B. Governmental approval**

Item	
Please check one of the following.	<input type="checkbox"/> This report is a first report. <p style="text-align: center;">or</p> <input checked="" type="checkbox"/> This report is an intermediate report. <p style="text-align: center;">or</p> <input type="checkbox"/> This report is a final report.
Please check one of the following:	<input checked="" type="checkbox"/> This report is a joint report. Letter(s) of approval of this report from the designated national authority of the other Party(ies) involved in the activity is(are) attached in Section J, Annex. <p style="text-align: center;">or</p> <input type="checkbox"/> This report is a separate report.
Additional comments (if any):	

**C. Compatibility with, and supportiveness of, national economic development and socioeconomic and environmental priorities and strategies**

Compatibility with Economic Development and Socioeconomic and Environmental Priorities
This information is not yet available.

**D. Environmental, social/cultural, and economic impacts of the AIJ project**

<b>Non-Greenhouse-Gas Environmental Impacts of the Project</b>
<p>Small-scale cultivation on the 30 hectare Phase I project site are unlikely to have significant negative non-GHG impacts. However, since Phase II will involve large-scale <i>Salicornia</i> production and commercialization of short- and long-lived biomass products, several activities are underway in Phase I to evaluate the potential positive and negative impacts associated with Phase II activities.</p> <p>The use of fertilizers and pesticides may potentially have a negative impact on both terrestrial and marine coastal wildlife. These issues will be directly addressed by an environmental impacts assessment conducted in Phase II. Initial data collection and review suggest that the toxic effects of the pesticides and fertilizers used—carbendazim, diammonium phosphate, and anhydrous ammonia—and risks of ecological destruction associated with these chemicals, is low. Any negative effects associated with these pesticides and fertilizers can be minimized by implementing safe usage and storage practices on-site.</p> <p><i>Salicornia</i> farming may also negatively impact coastal biodiversity. To prevent the spread of <i>Salicornia</i> beyond the intended cultivation area, the <i>Salicornia</i> crops will be planted on abandoned agricultural fields that do not receive water naturally either from waves or storms that come inland from the coast. Participants are engaged in discussions with The Nature Conservancy and Conservation International to collect information on possible biodiversity effects of Phase I and II.</p> <p>Large-scale irrigation of <i>Salicornia</i> could result in saltwater intrusion into freshwater coastal aquifers. Recognizing this potential negative impact, Phase II project sites have been chosen for their close proximity to the sea to allow for estuary irrigation directly from the sea or from on-site, saltwater wells. Test wells will be drilled at each site to identify any possible freshwater aquifers and potential for salt migration into freshwater resources. Salt migration and water table levels have already been monitored at the Phase I Kino Bay site, revealing no evidence of saltwater intrusion into freshwater resources.</p> <p>The positive non-GHG impacts associated with large-scale halophyte cultivation anticipated in Phase II of the project include slowing the process of desertification in some areas, possibly offsetting forest clearing, and removing toxic metals from wastewater. To the extent that <i>Salicornia</i> or other halophyte products may directly substitute for forest products, project GHG and non-GHG benefits may include mitigation of clear-cutting forests. However, it may not be possible to accurately quantify these benefits.</p>
<b>Social/Cultural Impacts of the Project</b>
<p>There is very little likelihood that the project will have any negative social impacts on the region. Large tracts of land are now lying fallow because of the lack of adequate freshwater resources needed for conventional farming. An informal assessment by the University of Arizona’s Environmental Research Laboratory (ERL) indicates that if Phase II of the project is initiated, unemployed farmers and displaced fisherman are likely to benefit from employment opportunities in halophyte farming.</p>
<b>Economic Impacts of the Project</b>
<p>Most of the regional agricultural development over the last 30 to 50 years has depleted freshwater supplies and caused saltwater intrusion into deep wells. In many cases, the Government of Mexico has relocated segments of the agriculturally dependent population, and provided new wells for irrigation. With these new wells, irrigation costs are about \$10,000 per hectare. To the extent that halophyte farming can take hold in the region, irrigation costs will fall to approximately \$3,000 per hectare.</p>

**E. Greenhouse gas impacts of the AIJ project**

**1. Scenario description**

Item	
<b>Site Designation</b>	
Site number (order of presentation in this report)	1 of 1
Site name/designation	Phase I
Project sector	Agriculture
<b>Reference Scenario</b>	
Primary activity(ies)	None (idle, unproductive desert land)
Has the reference scenario changed since the last report? (If yes, explain any changes below.)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> This is the first project report.
<p>Description:</p> <p>The project developers assume that in the Phase I reference scenario, the project area would remain as unused and unproductive desert land without significant vegetation or soil carbon. The University of Arizona’s Environmental Research Laboratory has extensively tested the soil at the project site to verify soil carbon stocks prior to <i>Salicornia</i> cultivation.</p> <p>Although Phase II has not been initiated and is not considered part of the USIJI project, the project developers have begun to collect data and information to develop the Phase II reference scenario and emission projections.</p>	
<b>Predicted Project Scenario</b>	
Primary activity(ies)	<i>Salicornia</i> cultivation and crop management; technical analysis of soil carbon accumulation and commercial feasibility of <i>Salicornia</i> cultivation
<p>Description:</p> <p>The 30 hectare project site was chosen because it is ready for operation, and represents a manageable plot in which to research and demonstrate <i>Salicornia</i> cultivation. The Phase I project scenario is based on the assumption that the <i>Salicornia</i> crop will result in the accumulation of soil carbon. Since the project area will be harvested annually, the project developers assume there will be almost no carbon accumulation in above-ground biomass. In addition, since the production of long-term biomass products will not occur until Phase II of the project, the project scenario for Phase I does not include carbon benefits associated with carbon storage in long-lived products.</p>	
<b>Actual Project</b>	
Primary activity(ies)	This information is not yet available.
<p>Description:</p> <p>This information is not yet available.</p>	

## 2. GHG emission/sequestration calculation methodology

<b>GHG Emission/Sequestration Calculation Methodology</b>	
Site number	1 of 1
Project sector	Agriculture
<b>Description of Calculation Methodology for the Reference Scenario</b>	
The project developers estimate that zero carbon is stored on the project area in the reference scenario. In the absence of the project, it is assumed that the project area would remain without significant vegetation or soil carbon.	
<b>Description of Calculation Methodology for the Project Scenario</b>	
During Phase I, the project developers anticipate that soil carbon will accumulate over the 60-year project lifetime. The project developers estimate that over 100 years, the project area would reach a steady-state value of 22 short tons C/acre. This is equal to 49.317 metric tonnes C/hectare (= 22 short tons C/acre * 0.9072 metric tonnes/1 short ton * 1 acre/0.4047 hectares). Since the project area is 30 hectares, soil carbon accumulation on the entire project area is estimated to be 1,479.5 metric tonnes C (= 49.317 t C/ha * 30 ha). To convert to units of CO <sub>2</sub> (i.e., on a full molecular weight basis), this value was multiplied by the ratio of 44 t CO <sub>2</sub> /12 t C. Thus, the cumulative amount of CO <sub>2</sub> sequestered over 100 years would be approximately 5,425 t CO <sub>2</sub> (=1,479.496 t C * 44 t CO <sub>2</sub> /12 t C). To estimate CO <sub>2</sub> sequestered over the 60-year project lifetime, 5,425 t CO <sub>2</sub> was multiplied by 0.6. As a result, the estimate of CO <sub>2</sub> sequestered by the project is 3,255 metric tonnes CO <sub>2</sub> .	
<b>Description of Calculation Methodology for the Actual Project</b>	
This information is not yet available.	

## 3. GHG emission/sequestration data

### (a) Reporting of GHG emissions/sequestration

Information on annual GHG emissions is not yet available. Cumulative GHG benefits associated with Phase I of the project are anticipated to be 3,255 t CO<sub>2</sub>.

**(b) Additional information on GHG emissions/sequestration**

<b>Indirect or Secondary GHG Impacts (Positive and Negative)</b>
Energy consumption for irrigation during Phase I of the project will result in secondary carbon dioxide emissions of approximately 0.84 t C/ha-yr. Initial energy efficiency improvements planned for Phase I are expected to reduce annual secondary emissions from energy consumption to about 0.70 t C/ha-yr. These secondary emissions are still high compared to emissions from energy consumption associated with conventional farming, which are about 0.15 - 0.2 t C/ha-yr. Additional investments in energy efficiency will occur in Phase II, when such investments will be more cost-effective. With Phase II energy efficiency improvements, emissions from energy consumption for irrigation are anticipated to fall to 0.28 t C/ha-yr.
<b>Factors That Could Cause the Future Loss or Reversal of GHG Benefits</b>
Factors that could cause anticipated GHG benefits to be lost or reversed in the future include crop failure and extreme natural events.  In addition, at the conclusion of Phase I, if it is determined that the project does not demonstrate a viable opportunity for large-scale halophyte cultivation, Phase II will not be initiated and project soil carbon benefits will be lost at a rate of 0.5 percent per year.
<b>Strategy for Reducing the Risk of Future Loss or Reversal of GHG Benefits</b>
This information is not yet available.

**F. Funding of the AIJ project**

**1. Identification of funding sources**

**(a) Funding sources for project development**

<b>Funding Source</b>	<b>Country of Funding Source</b>	<b>Amount (\$US)</b>	<b>Percent of Total Funding (%)</b>
SRP (carbon research and feasibility study)	U.S.A.	500,000	
University of Arizona's Environmental Research Laboratory (ERL)	U.S.A.		
EPRI	U.S.A.		
<b>Total</b>			<b>100</b>

**(b) Funding sources for project implementation**

<b>Funding Source</b>	<b>Country of Funding Source</b>	<b>Amount (\$US)</b>	<b>Percent of Total Funding (%)</b>	<b>Is This Funding Assured? (Y/N)</b>
Genesis, S.A. de C.V.	Mexico			Y
HEI	U.S.A.			Y
PDC	U.S.A.			Y
<b>Total</b>			<b>100</b>	

**2. Assessment of additional funding needs**

<b>Current or Planned Activities to Obtain Additional Funding</b>
No additional funds are required for Phase I.

**G. Contribution to capacity building and technology transfer**

<b>Contribution to Capacity Building and Technology Transfer</b>
The project will introduce a new agricultural crop on what is now unused desert land. In addition, the project will research and demonstrate <i>Salicornia</i> cultivation and crop management techniques, which are not widely practiced in the region.

**H. Recent developments, technical difficulties, and obstacles encountered**

<b>Recent Project Developments</b>
This information is not yet available.
<b>Technical Difficulties and Other Obstacles Encountered</b>
This information is not yet available.

**I. Additional information**

<b>Additional Information</b>
None.

**J. Annex**

**1. Host country acceptance of the AIJ project**

<b>Country/Project Title</b>	<b>Name, Title, and Government Agency of the Designated National Authority</b>	<b>Date of Approval (day/month/year)</b>
Mexico/Project <i>Salicornia</i> : Halophyte Cultivation	Carlos Gay, Coordinator of the Unit for International Cooperation and Agreement, National Ecology Institute (INE), Secretariat of the Environment, Natural Resources and Fisheries (SEMARNAP)	3 December 1996

**2. Letters of approval of this AIJ project report**

See attached letter of concurrence.