



Climate-Resilient Business Plan

for establishing a

Crop production farm with drip-irrigation system

(TEMPLATE)

First and last name: _____

Date of birth: _____

Address: _____

Telephone: _____

Email: _____

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TOGETHER WITH

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1. Summary

The proposed business idea is to produce _____ (crop/s) (e.g., melon) irrigated with drip-irrigation for increasing the productivity of the farm and decreasing water consumption, as well as for increasing the adaptive capacity of my farm against climate and water shortage risks.

In Uzbekistan, impact assessments from the implementation of drip-irrigation systems have shown increased yields averaging 40% for all crops and an irrigation application efficiency of 90% compared to 60% from surface irrigation (i.e., border, furrow, and basin). The implementation of drip-irrigation systems also brings savings of energy, labor, and input costs, while increasing product quality.

I would like to invest in implementing a drip-irrigation system for improving my _____ (crop/s) (e.g., melon) production in _____ (e.g., 1 hectare) of my farm. (Considering the last 2 years of production,) I estimate a total annual production of _____ (e.g., average melon yield - 25,000 kg/ha). Following local market's price (e.g., Uzbekistan's 2022 melon price USD 0.31 per kg), the estimated annual revenue is about _____ (e.g., 25,000 kg * 0.31 USD/kg = USD 7,750). After _____ (visiting/learning about) (e.g., visiting a neighbor's farm who has implemented drip-irrigation), I am interested in trying the system in my farm. Considering the referential price provided _____ (e.g., USD 4,000 per hectare), I am interested in investing in this system.

As a farmer situated in _____ (e.g., Kegeyli district) I have seen a reduction in water availability as well as lower quality of the water for irrigation, which has affected my farm as well as my neighbors' farms. I have been a farmer for _____ (e.g., the last 15 years) and I am looking for options to improve my farm's production as well as to improve the resilience of my farm considering the availability of natural resources.

2. The Business Idea

2.1. The Green Business Model

The climate-resilient business model consists in the production of _____ (crop/s) (e.g., melon) with drip-irrigation that will positively impact my farm's productivity and the resilience of my farm to changes in the availability of water resources. For this, my responsibilities will be to source raw materials and produce agricultural products by leveraging labor and equipment, while taking care of and properly manage the drip-irrigation system.

As part of these responsibilities, an estimate of water consumption with and without drip-irrigation system will be calculated. The estimated reduction in water consumption will serve for communicating to my customers and relevant government institutions on the farm's contribution to better use of resources.

Implementing drip-irrigation will also bring advantages to my customers by improving the yield and quality of the products, securing the supply and overall supporting food security efforts in the region.

Furthermore, I will also register my full-time and seasonal employees as staff on my farm as part of my sustainable business activities, contributing to environmental, social, and governance criteria. The official registration procedure for staff gives my employees access to social security services and will have a positive impact on the social structures and security system in my neighborhood. It is very important for me that my activities reflect environmental as well as social responsibility.

3. Personal qualification

3.1. Professional qualification

(EXAMPLE) After graduating from high-school I attended agricultural vocational studies for 2 years. While exercising my profession as a farmer during the past 15 years, I have attended technical agriculture seminars for improving the management of my farm as well as for keeping records of my business practices for improving decision making. The last seminar I attended was provided by DSIK where I learned about how to conduct my business, develop a business plan and how to talk with banks.

3.2. Entrepreneurial qualification

(EXAMPLE) My continuous seek for doing things better responds to my desire to improve the productivity of my farm, to support my family, as well as to create a favorable environment for me and my neighbors which can allow us to continue our production practices in the long-term.

While helping my parents with the production of cotton I got good insights of everyday farm business life from an early age. Following my technical learning and my work for the last 15 years, I

have looked for solutions that can help me improve my farm's production while not having a negative impact on the environment and while improving the welfare of my employees.

As main manager of the farm, I have been responsible year after year for the production of melon, the purchase of inputs like, for example, seeds and fertilizers, as well as for preparing the land and securing a proper production process. This experience has allowed me to understand the proper management of the farm and the need for seeking solutions that can further improve the productivity of it.

3.3. Motivation to implement a climate-resilient business model.

(EXAMPLE) I have recently attended a training session in which I acquired knowledge of the additional benefits from water saving technologies. In addition, I was able to understand my farm's vulnerability to climate change and the need to take action now in order to improve the adaptive capacity of my farm to keep producing crops in the long-term. It also made me aware of the responsibility that I bear as a local employer for nature as well as for my staff and their families.

It is important to me to be able to secure a long-term production of my farm and achieve profitable returns. Therefore, I have been looking for actions that I can take on my farm in order to improve the yield of my inputs and secure the farm's long-term productivity. While seeking for solutions for my farm, I got to understand that some solutions will not only positively impact to my farm, but they will also have a positive impact on my neighbor's farm as well as on our community. Therefore, I am eager to implement actions that can help me and the people around me to have a better future.

4. Market

4.1. Market volume

(EXAMPLE) According to a recent training that I attended I could learn that Uzbekistan is famous for its melons. Melon exports bring over USD 50-60 million to the country each year and make it an important export fruit after table grapes. There is significant scope for Uzbekistan to expand melon production and exports, targeting countries in Europe, such as the United Kingdom and the Scandinavian countries, specifically with off-season products. Opportunities to produce for this market segment also exist in Southeast Asian and Middle Eastern countries. Significant exports to Korea have commenced in recent years as well.

As a melon producer, I know that there are more than 160 varieties of melons in the country. People consider that melons from Karakalpakstan are the best as they are sweet yet hard.

4.2. Market development/trend

(EXAMPLE) I have observed that melon production has declined in recent years in Northern Karakalpakstan due to local market limitations. Depending on the variety, between 20-35% of the produced melons are lost due to unavailable post-harvest handling (processing) technology. Throughout the winter, melons are preserved according to an old method where they are put into

straw or thread net bags and then hung from the ceiling of a special warehouse called a "kovunkhana", or buried in dry sand. Usually about 10-20% of the melons lose their market potential during storage due to visual characteristics and the flesh rotting fungi.

Due to seasonality of the Karakalpak melons which ripen in the fall, fresh melon export destinations are mainly Russia, Kazakhstan, and partly Kyrgyzstan. I have observed great potential and opportunities for exporting good quality melons.

4.3. Risks in the market

(EXAMPLE) In order to improve productivity, my neighbors are resorting to short-term measures to increase production like an excessive use of synthetic fertilizers. Yet, I have opted to apply different measures following the Good Agriculture Practice Manual for Uzbekistan, implementing water efficient irrigation technologies. Therefore, in the short-term, I may face a competitive disadvantage against my neighbors in terms of economic performance.

Another risk is the possible disinterest of my buyers and government institutions in the positive impact of my practices in terms of water conservation. However, considering the Global and Uzbekistan's agenda for the development of the agriculture sector and for adapting to climate change and resource availability risks, taking actions now as well as reporting on the benefits of these actions will take high relevance in the near future. Additionally, aligning my business activities with environmental, social, and governance criteria, can attract free funding, technical assistance, and other benefits through international donor organizations.

SECTION 4 NOTE – Potential Source of Information:

For Uzbekistan

- Agriculture Statistics – <https://stat.uz/en/official-statistics/agriculture>
- Product prices and news - <https://agromart.uz/en> (APP - Agromart)

For Karakalpakstan

- Agriculture Statistics – <https://stat.uz/en/official-statistics/agriculture>
- Regional Statistics - <https://karakalpakstan.uz/en/page/show/1>
- Product prices, knowledge materials, and news - <https://greenaral.uz/en> (APP - Jasilawil)

5. Customers

5.1. Operating radius

(EXAMPLE) My farm is located in Kegeyli District, northwest of Narimbet township, in the Republic of Karakalpakstan. The total farm size is 2.3 ha, it has access to a primary canal for irrigation purposes, and it is exposed to winds of 1 m/s.

5.2. Target group

(EXAMPLE) In Karakalpakstan, fruit production is mostly handled by aggregators and large farm enterprises who collect, process (cleaning and sorting), and distribute or sell the products in markets. Most of local production is sold through local markets for household consumption.

5.3. Customer needs and customer benefits

(EXAMPLE) Local requirements are not that strict in terms of quality and quantity. However, this has a direct impact in terms of lower sales and income. Yet, I have observed that some aggregators have started to work with international customers and have upgraded their facilities for aggregation. These aggregators are demanding higher quality and to meet safety standards. There are some who are even asking greater quantities for further processing and export. Foreign buyers are also increasingly paying attention to local employment conditions.

6. Competitive Analysis

6.1. Preliminary remarks

(EXAMPLE) In the following section I have identified local competitors producing melon within a radius of 25 km. In addition to the 3 farms described below, there are some small farms producing melons in the region. Most of them follow the same type of activities with little differentiation among them.

6.2. Competitor 1

(EXAMPLE) Fruit farm producing melon, watermelon, and fruits with a farm size of 3.4 ha and access to primary canal with limited water for irrigation.

6.3. Competitor 2

(EXAMPLE) Melon farm in 0.1 ha in a total farm size of 0.9 ha and access to secondary canal with limited water for irrigation.

6.4. Competitor 3

(EXAMPLE) Fruit farm including melon in a total area of 0.1 ha.

7. Sales and Communication

(EXAMPLE) As mentioned before, there is little differentiation between melon farms in the region. Therefore, I find the implementation of drip-irrigation, as well as the reporting of water conservation as a good differentiation strategy to showcase my commitment to improve my farm practices with a positive impact to water conservation. Currently, there are online platforms in Karakalpakstan, like for example Jasilawil, where I can showcase my farm's experience in order to motivate other farmers to take action, as well as to capture the attention of programs that are supporting farmers to further improve the productivity of their farms. By showcasing my commitment to contribute to a positive change, it may provide me with the opportunity to access additional green technologies and financing to keep improving my farm practices.

8. Procedures and Organization

8.1. Core processes

(EXAMPLE) As the responsible and representative for my farm, I would like to set up a mutual agreed contract with XXX aggregator in Kegeyli. My differentiation with other farmers will be the annual monitoring of product quality and reporting on water conservation.

I will be responsible to acquire the needed production inputs, as well as negotiating and registering contracts for additional labor required. I will also be in charge of managing the soil preparation, planting, caring, controlling for pest and diseases, and harvesting, trying to follow the Good Agriculture Practice Manual for Uzbekistan.

8.2. Supporting processes

(EXAMPLE) I am supported by my partner in accounting. My partner has very good knowledge in this area following the education received and previous work experience. For more complex questions or for the annual accounts and tax payment, I will consult with a tax consultant.

In addition, I will make use of the pool of consultants available on the platform Jasilawil (e.g., Agromart for Uzbekistan) for any additional technical or farm management question that I need to clarify.

SUB-SECTION 8.2. NOTE – Potential Platform for Accessing Support:

For Uzbekistan

- Consultation Services - <https://agromart.uz/en> (APP - Agromart)
- Chamber of Commerce and Industry of Uzbekistan - <https://chamber.uz/en/index>

For Karakalpakstan

- Consultation Services - <https://greenaral.uz/en> (APP - Jasilawil)
- Chamber of Commerce and Industry of Uzbekistan - <https://chamber.uz/en/index>

8.3. Staff planning

(EXAMPLE) In addition to my own and my partners' labor force, my farm regularly employs 2 seasonal staff for melon related activities. The staff seasonally employed is and will continue to be formally registered keeping their employment record books open. This allows and will allow to keep contributing as employer to the Social Tax and secure their social benefits.

8.4. Infrastructure and Equipmen

(EXAMPLE) No major infrastructure is needed for operating the farm. In terms of equipment, I have hired a consultant to support me designing the implementation of drip-irrigation. In addition, I will lease a truck from local service providers when harvesting or when necessary.

SUB-SECTION 8.4. NOTE – Potential Platform for Accessing Technology Support:

For Uzbekistan

- Consultation Services - <https://agromart.uz/en> (APP - Agromart)
- Innovation and Tech Support - <http://akis.agro.uz/uz>
- Water Management Equipment and Consultancy – APP - TOMЧИ

For Karakalpakstan

- Consultation Services - <https://greenaral.uz/en> (APP - Jasilawil)
- Water Management Equipment and Consultancy – APP - TOMЧИ

9. Explanation of target figures.

(EXAMPLE) The revenue planning is based on 200 field workdays and considering a farm size of 1 hectare of melon production. The estimated annual revenue of USD 7,750 considers an annual yield of 25,000 kg/ha, and a market price of 0.31 USD/kg. On the other hand, the operational expenses consider those related to planting, cultivation costs, labor costs, harvest costs, and profit and other taxes. The total operational expenses are estimated at 60% based on current operations.

In terms of additional investment for the farm, the drip-irrigation system that I am interested in installing in one hectare has a value of USD 4,000 including the installation costs. I am planning to acquire a credit of 4 years for covering the USD 4,000.

10. Revenue and Profitability forecast

(EXAMPLE)

Years	1	2	3	4	5	6
A) Income (1)	7,750	7,750	7,750	7,750	7,750	7,750
1) Crop (e.g., melon) Income (a x b)	7,750	7,750	7,750	7,750	7,750	7,750
a) Yield (farm yield, kg/ha)	25,000	25,000	25,000	25,000	25,000	25,000
b) Price per unit (USD/kg)	0.31	0.31	0.31	0.31	0.31	0.31
B) Operational Expenses (3+4+5+6)	4,832	4,832	4,832	4,832	4,832	4,032
3) Crop Expenses (c+d+e)	3,235	3,235	3,235	3,235	3,235	3,235
c) Planting & management						
Land preparation	350	350	350	350	350	350
Planting seeds	200	200	200	200	200	200
Soil tilling	900	900	900	900	900	900
Plant thinning	400	400	400	400	400	400
d) Inputs						
Seeds	15	15	15	15	15	15
Fertilizers	450	450	450	450	450	450
Pesticides	350	350	350	350	350	350
Water (irrigation)	80	80	80	80	80	80
Equipment maintenance	40	40	40	40	40	40
Diesel	250	250	250	250	250	250
e) Harvest						
Crop harvest	200	200	200	200	200	200
4) Labor (f+g)	404	404	404	404	404	404
f) Personnel	400	400	400	400	400	400
g) Taxes on salaries* (12%)**	4	4	4	4	4	4
5) Depreciation (h)	800	800	800	800	800	0
h) Equipment	800	800	800	800	800	0
6) Input & Turnover Taxes** (i+j+k)	393	393	393	393	393	393
i) Turnover (4% or 12%)**	155	155	155	155	155	155
j) Water (4 USD/m ³)**	236	236	236	236	236	236
k) Land (4 USD/ha)**	2	2	2	2	2	2
C) Earnings Before Interest and Taxes (A-B)	2,918	2,918	2,918	2,918	2,918	3,718
D) Interest and Loan Repayment (7+8)	1,680	1,510	1,340	1,170	0	0
7) Loan Repayment	1,000	1,000	1,000	1,000		
8) Interests (17%)	680	510	340	170		
E) Taxes (10)	156	162	169	175	219	279
9) Income Tax (15%)** [(C-D)*Tax]	156	162	169	175	219	279
F) Net Income (C - D - E)	1,082	1,246	1,409	1,573	2,699	3,439

***Social Tax** – 12%

** **Turnover Tax** – 4% from total sales when entities annual turnover does not exceed USD 100,000. 12% when annual turnover exceeds USD 100,000. **Water Tax** for agriculture lands – estimated at USD 4 per m³. **Land Tax** is based on soil fertility and the type of land (irrigated or dry-land) – estimated at USD 4 per hectare.

*** According to Presidential Decree No. 213 (August 31, 2022) 'On additional measures to improve the welfare of the population of the Republic of Karakalpakstan through the accelerated development of entrepreneurship, innovative technologies and infrastructures', enterprises in Karakalpakstan, including farming entities, will pay 50% of all 'Input & Turnover Taxes', as well as of 'Income Tax', and 1% of 'Social Taxes' from January 1st, 2023, until January 1st, 2028.

11. Capital Requirements and Financing

(EXAMPLE)

	Total Cost	Financing costs per year
G) Long-term investments	4,000	
10) Property		
11) Structure		
l) Greenhouse/hotbed		
12) Machinery		
m) Trellis system (inc. installation)		
n) Tractor		
o) Tractor equipment		
p) Irrigation system (inc. installation)	4,000	17% Interest (4 years)
H) Medium- and Short-Term Investments		
13) Equipment		
I) Upfront Costs		
14) Registration		
15) Legalization		
16) Education and Training		
J) Total Capital Required	4,000	
K) Expenditures per year		4,000

12. Environmental Benefits

(EXAMPLE)

L) Water Conservation (m ³ /day/ha) (17 - 18)	58
17) Under surface irrigation $[(q/r) * (1 + s) * t]$	176
q) Daily crop evapotranspiration~	7.4
r) Irrigation system application efficiency~	60%
s) Leaching requirement~	43%
t) Multiplier for conversion of mm/day to m ³ /ha	10
18) Under drip-irrigation $[(q/r) * (1 + s) * t]$	118
q) Daily crop evapotranspiration~	7.4
r) Irrigation system application efficiency~	90%
s) Leaching requirement~	43%
t) Multiplier for conversion of mm/day to m ³ /ha	10
M) Total water conservation (L * # of ha under drip irrigation - m ³ /day)	58

~Referential information is provided in Annex 1.

13. Profit to cover living expenses.

	Per month	Per year
N) Living expenses		
19) Food		
20) Clothing		
21) Health		
22) Education		
23) Others		
O) House expenses		
P) Social Security		
24) Insurance		
25) Pension		
Q) Interests and Taxes		
26) Loan repayment and interests		
27) Taxes		
R) Total household expenses (N+O+P+Q)		

ANNEX 1: Water Conservation Referential Information

1. Crop's maximum daily evapotranspiration (ET_c)

Evapotranspiration is the loss of water from the soil both by evaporation and by transpiration from the plants growing thereon. Evapotranspiration is not the same for different plants and it also varies with the season. The maximum evapotranspiration during the season is used for designing irrigation systems. The maximum crop evapotranspiration rates have been calculated based on research conducted in the Amu Darya River Basin and shown in the Table 1 below for reference.

Crop	ET _c (mm/day)
Cotton	8.5
Wheat	6.9
Rice	7.3
Alfalfa	6.7
Maize	8.5
Vegetables	6.3
Melon	7.4
Fruits	6.0
Sorghum	7.1
Potato	8.1

2. Irrigation System Application Efficiency

Irrigation application efficiency expresses how much of the irrigated water is actually available to the plant. The lower the efficiency, expressed as a percentage, the more water must be irrigated to satisfy the crop's needs. Table 2 summarizes the application efficiencies of different irrigation methods for reference.

Irrigation methods	Field Application Efficiency
Surface irrigation (border, furrow, basin)	60%
Sprinkler irrigation	75%
Drip irrigation	90%

3. Leaching Requirement

All irrigation water contains salt. Plant roots extract nutrients from the soil solution leaving most salts behind. If the salts are not leached out of the plant's rootzone, the accumulation of salts will create a lower osmotic pressure in the soil thereby hindering the roots' ability to function normally. The plant expends extra energy to extract nutrients leading to stress, physiological damage, and lower yields. Additionally, sodium and chloride are toxic to many plants. The Leaching Requirement, or Leaching Fraction, refers to the amount of additional water required to leach salts out of the

rootzone of your crop. The higher the salt content of your irrigation water, the higher the leaching requirement.

Table 3 shows the estimated Leaching Requirement as a percentage where the **irrigation water salinity (ECw)** and the **maximum soil salinity threshold for crops (ECe)** intersect.

Table 3 Irrigation Water Salinity (Electrical Conductivity) (ECw)

	dS/m	0.2	0.5	0.7	1.0	1.3	1.5	2.0	2.5	3.0	4.0	5.0	6.0	7.0
Maximum Soil Salinity Threshold (ECe)	0.5	9	25	39	67	108	-	-	-	-	-	-	-	-
	1.0	4	11	16	25	35	43	67	100	-	-	-	-	-
	1.5	3	7	10	15	21	25	36	50	67	114	-	-	-
	2.0	2	5	8	11	15	18	25	33	43	67	100	-	-
	2.5	2	4	6	9	12	14	19	25	32	47	67	92	-
	3.0	1	3	5	7	9	11	15	20	25	36	50	67	88
	3.5	1	3	4	6	8	9	13	17	21	30	40	52	67
	4.0	1	3	4	5	7	8	11	14	18	25	33	43	54
	4.5	1	2	3	5	6	7	10	13	15	22	29	36	45
	5.0	1	2	3	4	5	6	9	11	14	19	25	32	39
	5.5	1	2	3	4	5	6	8	10	12	17	22	28	34
	6.0	1	2	2	3	5	5	7	9	11	15	20	25	30
	6.5	1	2	2	3	4	5	7	8	10	14	18	23	27
	7.0	1	1	2	3	4	4	6	8	9	13	17	21	25

These two pieces of information will allow you to calculate your leaching requirement which will directly affect the volume of water your irrigation system needs to deliver.

3.1. Irrigation Water Salinity (ECw)

First, you must know the salinity of the water you are using for irrigation. Both water and soil salinity are usually measured by its electrical conductivity, either dS/m or uS/cm. Water salinity may be measured easily by a handheld meter.

3.2. Maximum Soil Salinity Threshold (ECe)

The table below shows the maximum documented salinity thresholds for plants at which there will be no expected reductions in yields. The table has been compiled from several sources and serves for referential purposes.

Plant (Common Name)	Maximum Soil Salinity Threshold at Which Growth and Yield Reductions Begin (ECe dS/m)
Small Vegetables	
Broccoli	2.8
Brussel sprouts	1.8
Cabbage	1.8
Carrots	1.0
Cauliflower	1.8
Celery	2.5
Lettuce	1.7
Onions	1.2
Spinach	3.2
Radishes	2.0
Vegetables (Solanum Family)	
Egg Plant	1.5
Peppers	1.7
Tomato	2.5
Vegetables (Cucumber Family)	
Cucumber	2.5
Cantaloupe melon	2.2
Musk melon	1.0
Pumpkin, winter squash	3.9
Squash, Zucchini	4.7
Squash (Scallop)	3.2
Watermelon	2.0
Roots and Tubers	
Beets, red	4.0
Garlic	3.9
Parsnip	0.8
Potato	1.7
Sweet potato	1.5
Turnip	0.9
Sugar beet	7.0
Legumes	
Beans	1.0
Broadbean (faba bean)	1.6
Cowpea	4.9
Peanut	3.2
Peas	1.5
Soybeans	5.0
Chickpeas	3.0
Perennial Vegetables	
Aritchokes	6.1
Asparagus	4.1
Mint	
Strawberries	1.5
Fibre Crops	
Cotton	7.7
Flax	1.7

Plant (Common Name)	Maximum Soil Salinity Threshold at Which Growth and Yield Reductions Begin (ECe dS/m)
Oil Crops	
Safflower	5.3
Sunflower	2.3
Caster bean	7.1
Cereals	
Barley	8.0
Oats	5.2
Corn	1.7
Sweet corn	1.7
Millet	6.0
Sorghum	6.8
Rice	3.0
Wheat	6.0
Wheat (semidwarf)	8.6
Wheat (durum)	5.9
Forage Crops	
Alfalfa	2.0
Barley	6.0
Bermuda	6.9
Clover	1.5
Cowpea (forage)	2.5
Fescue	3.9
Foxtail	1.5
Hardinggrass	4.6
Lovegrass	2.0
Maize (forage)	1.8
Wheatgrass, tall and fairway crested	7.5
Wheatgrass, standard crested	3.5
Grapes and berries	
Raspberries	1.0
Blackberry	1.5
Boysenberry	1.5
Grapes	1.5
Fruit Trees	
Almonds	1.5
Apples	1.7
Peaches	1.7
Nectarines	1.6
Cherries	0.9
Pear	1.7
Apricot	1.6
Plum, prune	1.5
Pomegranate	2.7
Walnut	1.7
Persimmon	2.0
Chinese Date	4.0
Figs	6.0
Deciduous Trees	
Poplars	4.0
Willow	4.0