General Department of Economic and Financial Affairs of Khuzestan

Preparation and Compilation of Investment Opportunities in The Province

Investment opportunity studies report

(Fullerene C70, C60 production plan))



(Attachment Number 1

Date: 2023/02/07





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1) Location of the project 1-1- Province

Khuzestan province is located in the southwest of Iran (in 47° 42' to 50° 39' east of the Greenwich meridian and 29° 58' to 32° 58' north of the equator). The area of Khuzestan province 63,238square kilometers. With a population of 4,994 is thousand people in 1400SH, it is the fifth most populous province in Iran (after Tehran, Khorasan Razavi, Isfahan and Fars provinces). Ahvaz is the capital of Khuzestan province and is located in the 880km of Tehran. This province is bordered by ILAM province from the northwest. Lorestan province from the north, CHAHARMAHAL and BAKHTIARI, KOHGILUYEH and BOYERAHMAD provinces from the northeast and east, the Persian Gulf (330km long) from the south and Irag (330km long) from the west. The location of Khuzestan is in the west of Zagros mountains. Due to the vastness of its plains, the border with Iraq and the Persian Gulf, and the distance from other provincial centers have placed this province in a strategic position.

1-2- County

According to the latest national divisions of 1401 of the Ministry of Interior, this province has 29 counties, 70 districts, 145 villages, 90 cities and 3 special governorates. The latest political divisions of the province are described in Figure (3).

Ahvaz is one of the cities of Khuzestan province, centered in Ahvaz city. Ahvaz has a population of 1,420 thousand people, 28% of the population of the province. This city has a common border with SHUSHTAR, BAVI and RAMSHIR cities from the east, HAMIDIEH and HOIZEH cities from the west, KARKHE city from the north and Khorramshahr, Karun and Bandar Mahshahr cities from the south. After passing through DEZFUL, it enters Ahvaz and connects to Karun River at BANDGIR, which after the confluence of two Dez rivers, Karun forms the great Karun River, and after passing Ahvaz, it enters Abadan and Khorramshahr. A total of 185 km from the Karun River, 61 km from the Karkheh River and 5 km from the Dez River are located in Ahvaz.

From the industrial point of view, Ahvaz is considered the vital artery of Khuzestan province where large factories of food, mineral, metal, and chemical industries have been established there. In the industry sector, there are five industrial towns (Ahvaz 1 to 5).

Critical industrial centers including National Iran Drilling Company, Steel Complex, National Steel Industrial Group, Pipeline Company, Oil and Gas Companies, Northeast Agriculture and Industries, DEHKHODA and sugarcane ancillary industries are located in Ahvaz. In addition, sandstone and wind

Türkmenista Figure (1): The Province Location In Iran Figure (2): Shadgan Location in Khuzestan Province

(industrial) mines and rich oil and gas resources are being exploited in the area of Ahvaz and many utilization units and management facilities in the southern oil-bearing areas, including exploration, drilling and oil and gas production facilities are settled in Ahvaz. The prosperity of agriculture and industries in the region has led to the prosperity of commerce and all kinds of industrial products such as steel, iron sheets, pipes, profiles, industrial parts, artificial leather, pressure vessels and heat exchangers, all kinds of iron, oil and all kinds of petroleum products, sanitary products and detergents, food, agricultural products such as wheat, barley, tares, dates and fishery products are among the most important products exported from this region locally and internationally.



2) Project Status

The location of the land in Ahvaz Industrial Town 5 is proposed with the following specifications and an area of about 2,000 square meters. Taking industrial land in this place requires industry, mining and trade permits and the approval of the industrial estates company and approval of the city's environment. One of the reasons for choosing this place is its proximity to the center of the province. The distance between this industrial town and Ahvaz city is about 17 kilometers.

2-1- Access to infrastructures

Currently, there are water, electricity and gas infrastructures in this industrial town. In terms of access



to transportation, this town is in a good position. The distance of the chosen place to the Ahvaz-Imam Khomeini Port freeway is 1.2 km and its distance to Imam Khomeini Port is 107 km. Ahvaz airport is also located 15.7 km away from the place. Based on this, raw materials will be supplied from Imam Khomeini port.

Table (1). access to initiasti detailes										
	No.	Required Infrastructure	Required Distance Infrastructure Status							
	1	Water	0.8	Ahvaz industrial Estate no 5						
	2	Electricity	Electricity 0.8							
	3	Gas	Gas 0.8							
	4	Telecommunication	ecommunication 0.8							
	5	Main road	1.2	Ahvaz — Imam Khomeini port highway						
	6	Side road	0	Industrial Estate transportation						
	7	Airport	15.7	Ahvaz airport						
	0	Bort	107	Imam Khomeini						

8

9

Port

Railway Station

107

18.7

Port

Ahvaz Railway

Table (1): access to infrastructures



3) Technical specifications of the project

3-1- Product

Fullerene is one of the artificial forms of carbon element; which is made by heating graphite. Fullerene, the first known spherical carbon molecule with ordered carbons, is in a sphere shaped like a soccer ball. Due to the similarity of its shape to a soccer ball, it is also called Bucky Ball.

Fullerene itself has many different types and can be spherical, oval, or cylindrical. The word fullerene is derived from the name "Buckminster Fuller" who designed geodesic domes.

Carbon in nature has 4 allotropes: diamond, graphite, amorphous carbon and fullerene, all of which are solid. Fullerene has a structure similar to graphite, but instead of all hexagons, it contains pentagons (or possibly heptagons) of carbon atoms that form planes in the shape of spheres, ellipses, or cylinders.

Fullerenes are identified according to the number of atoms in their structure. A letter C is used to name fullerenes, which represents the carbon atom in their structure. After the letter C, the number of carbon atoms in the fullerene spherical network unit is mentioned; For example, the molecule C60 has 60 carbon atoms.

The number of atoms in the fullerenes produced so far varies from 28 to hundreds of carbon atoms. The bases of fullerenes are sheets found in graphite, with the difference that in the atomic structure of fullerenes, instead of the regular hexagons found in graphite sheets, there is a series of regular hexagons and pentagons that form a fullerene sphere.

Placing these pentagons and hexagons next to each other is necessary to form a spherical structure. In fact, without the presence of pentagons in the graphene structure, spherical structures cannot be obtained from graphene sheets. These cage-like molecules are known with the formulas C60, C70 and C78. Fullerene consists of a network of pentagons and hexagons.

A fullerene must have exactly 12 pentagonal faces to be packed into a spherical shape, but the number of hexagons can vary widely. Building C60 has 20 hexagonal faces and C70 has 25 hexagonal faces.

The beautiful and unprecedented shape of fullerenes and the amazing properties of these molecules have attracted the attention of many scientists. The most stable and abundant fullerenes are C60 and C70 types. Therefore, most of the properties mentioned about fullerenes are also focused on these two types. Fullerenes



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are mechanically extremely strong molecules and can withstand very high pressures, so that they return to their original form (spherical fullerene structure) after a pressure of about 3000 atmospheres.

Recently, this property has been used in the production of nanocomposites. In this way, fullerenes are introduced into the base material as a filler and in this way, they improve the yield stress of the composites.

3-2- Project Requirement

3-2-1- Land And Required Infrastructure

For the production of fullerene, a land with an area of 2 thousand square meters and a production building with an area of 670 square meters are needed. The specifications of the land, main buildings and other required secondary buildings and investment in them are as described in the table below. Table (2): Amount of investment in land, landscaping and building

		(_)			
			Inves	stment Required	Total Cost
No.	Requirements	Description	Required Area m ²	Unit Price (Rial)	(Million Rials)
1	Land purchase 40 m * 50 m	2 thousand square meters in Ahvaz industrial town 5	2,000	6,700,000	13,400
2	Site preparation and development	According to relative calculations	1,330	8,496,241	11,300
		Production building (21*24)	350	100,000,000	35,000
3	Civil works, structures and	Office and management building	200	120,000,000	24,000
	bullulings	Other buildings (warehouse, etc.)	120	100,000,000	12,000
	٦	Fotal	-	-	95,700

3-2-2- Plant Machinery and Equipment

Table (3): Plant Machinery and Equipment

No	Equipment/Machinery	1	Required investme	Total cost	
NU.	Equipment/Machinery	Amount	Unit Price	Currency	(Million Rials)
1	Fullerene production system (electric resistance method)	1	18,000	Million Rials	18,000
2	2 Inter-particle separation laser system		34,000	Million Rials	34,000
	Total	-	-	-	14,525,000

	Table (4): Au	ixiliary and servi	ce plant Equipmen	t		
		Unit of	Type of	Require	d investment	Total cost
No. Distribut 1 Distribut 2	Equipment/Machinery	measurement	equipment	Amount	Unit Price (Million Rials)	(Million Rials)
1	Distribution Of Electricity / Demand Price	Kw	Facility	500	6	3,000
2	Several Electrical Cables	M	Facility	500	4.0	2,000
3	Electrical Equipment of The Greenhouse Lighting System	Amount	Facility	29	40	1,167
4	The Cost of Panel Boards and Related Electrical Equipment	Amount	Facility	2	320	640
5	Water Branch	-	Facility	1	3,000	3,000
6	Other Water Conveyance Equipment	Amount	Facility	2,000	2,000	
	Piping for drinking water, fire water and	m	Facility	300	8	2,400
	Other plumbing (electricity, etc.)	m	Facility	100	3	300
7	Firefighting, Safety and Health Equipment, etc.	Capsule	Facility	10	30	300
8	Gas Piping	М	Facility	400	5	2,000
9	Gas Branching	-	Facility	1	20,000	20,000
10	Water Heater and Heater	Machine	Facility	3	350	1,050
11	Air conditioning equipment	Fan	Facility	6	36	216
12	Air Conditioner	Set	Facility	5	1,000	5,000
13	Gas heater	ton	Facility	3	150	450
14	Car	Machine	Vehicle	1	7,000	7,000
15	Workshop and laboratory tools	Machine	Equipment	1	5,000	5,000
16	CCTV System	Set	Facility	1	2,000	2,000
17	office Equipment	Set	Equipment	3	700	2,100
18	Restaurant Equipment	Set	Equipment	15	30	450
19	Medical Equipment	Set	Equipment	1	1,000	1,000
20	Other Facilities	-	Facility	1	4,927	4,927
21		kw	Facility	500	6	3,000
22	Office Stuff	m	Facility	500	4.0	2,000
23		Amount	Facility	29	40	1,167
24		Amount	Facility	2	320	640
25		-	Facility	1	3,000	3,000
	Total			_	-	66,000

3-2-3- Raw Materials and Intermediate Parts

The specifications of fullerene raw materials are as described in the table below.

	Table (5): Costs of Raw Material for Production												
No.	Title	Production quantity at maximum capacity	Production quantity at maximum Unit Average price (Rials) Purchase unit Consump per prod unit unit unit				Amount of consumption in nominal capacity	The cost at the maximum nominal capacity (Million Rials)					
1	Graphite rods	600	kg	2.250.000.000	kg	6.7	4.000.00	9.000.000					



3-2-4- Management and human resource

For the production of graphite electrode, 16 human resources will be needed in the production and management and support department as described in table (6).

Table (6): Management	and Human	Resource
		N Luna la a	

No	Level of skill	Number of staff	Average basic salary			
1	Senior	10	211,111,111			
2	Mid-level	2	150,000,000			
3	Junior	4	85,000,000			
Numbe	er Of Direct Mid-Level Staff Required	2	Person			
Num	ber Of Direct Junior Staff Required	4 Person				
Num	ber Of Direct Senior Staff Required	10 Person				
	Total	16	person			

4) Ownership and legal permissions

4-1- land ownership

The suitable location for this project is One of the industrial towns in Ahvaz (Ahvaz Industrial Town 5). The legal right for exploiting the land is 6,700,000 Rials. This estate is subject to the rules and regulations of Less developed industrial towns. Having legal permits which are mentioned in 3.4 section are required to obtain a land in this estate. If the construction phase in this estate gets rejected, it should be established in Imam Port Economic Special Zone.

4-2- Intellectual Property and Concessions

In this plan, fullerene production is considered by electrical method. In this method, rod graphite is used to produce nanoparticles, and then the produced materials are separated. In order to build the desired devices, research teams with the knowledge of producing nanoparticles should be used.

4-3- Legal permissions

In order to produce this product, we need legal permits such as (establishment permit and operating permit) from the Khuzestan Province Industry and Mining Organization, and environmental permit. It is worth noting; Graphitization processes are carried out using furnaces and at high temperatures. The fuel used in the furnace is natural gas and has no non-virtual pollution. Machining processes are carried out in the presence of machining fluids and this makes the relevant processes not create dust in the surrounding environment.

5) market research and competition 5-1- Target market introduction

In 1966, a scientist named Dulles discussed for the first time the ability to produce closed spherical structures from carbon atoms. Four years later, in 1970, a scientist named OSAWA, in his research on carbon structures in nature, imagined a carbon molecule C60 with a structure similar to a soccer ball; Until in 1984, as a result of laser vaporization of graphite, large Cn carbon clusters were observed in the laboratory. (n has values between 30 and 90.) The original discovery of fullerenes occurred in 1985.

Theoretically, any material shows particle wave plasticity behavior, however Buckminsterfullerene (fullerene C60) is the largest material that shows this behavior. The appearance of fullerenes is different based on the thickness of the material, whether they are soluble or not, and the nature of the solvent.

Fullerene 60 is a strong C generator and can be isolated and therefore skin contact should be avoided. The potentials at which electrons are added become such that the solvent either gives electrons to the cage or accepts them from it. Hence, fullerene C60 has good curing properties and can easily clean other materials with which it is contaminated.

Usually, three methods are used to prepare fullerene C60:

1 (HOFFMANN-KRAUTSCHMER method including arc discharge between graphite rods in an

atmosphere of helium.

2 (Combustion of benzene in oxygen deficiency.

3 (condensation of polycyclic aromatic hydrocarbons through pyrolytic dehydrogenation or dehalogenation

Customs tariff code 39140000 is related to ion exchangers. According to the customs statistics, the amount of import and export of the country is given according to the table below until 2019.

Table (7): Import of ion exchangers based on polymers included in numbers 3901 to 3913 in primary forms

1399	1398	1397	1396	1395	1394	1393	1392	1391	1390	Year
0		484	1,790	0	1,633	443	1,553	1,601	1,736	Import weight (tons)
0	Not available	37,951	104,003	0	121,876	54,019	194,210	58,900	44,860	Rial value (million Rials)
0	available	904	3,051	0	4,136	2,035	7,875	3,961	4,139	Dollar value (thousands of dollars)

				-				-		
1399	1398	1397	1396	1395	1394	1393	1392	1391	1390	Year
0		1	0	1,420	0	0.3	170	9213911390Year7008Export weight (tons)758099Rial value (million Rials)7209Dollar value (thousands of dollars)		
0	Not available	3	0	100,301	0	18	6,758	0	99	Rial value (million Rials)
0		0.1	0	3,198	0	1	272	0	9	Dollar value (thousands

Table (8): Export of ion exchangers based on polymers included in headings 3901 to 3913 in primary forms



6) Physical progress of the project ■ No

D 🗌 Yes

This is a creative plan and it is defined in order to cover the needs of steel industries based in Khuzestan province. There has been no progress in the implementation of this project so far.

7) Operational plan and implementation scheduling

The time between implementation and utilization is estimated to be 24 months. Project production phase is expected at 1404 SH. The project scheduling is described in Table (9).

Table (9): Project Scheduling

year		1402			1403				1404				1405			
Operations/Season	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pre investment studies	I.															
Fundraising and starting																
Obtain legal permissions																
Providing engineering services																
Land purchase and preparation			I													
Selecting contractor			L													
Equipping site																
Construction and landscaping																
Order, purchase and transportation of machinery																
Machinery installation							I									
Facilities																
Hiring and onboarding of staff																
Unexpected delays																
Trial production																
production phase																

8) Financial Plan

8-1- Cost Estimation

Generally, there are two ways to fundraise for this project, fixed capital and initial working capital. The required investment before utilization is provided through fixed capital. Initial working capital will be used during utilization. Fixed capital includes, purchasing land, construction and landscaping, machinery and equipment, facilities, office stuff and pre-production costs. These types of costs are incurred at the beginning and before operation and are consumed during the life of the project according to their service life. Working capital includes the capital required during the operation of the project. The working capital of a production unit is the set of facilities, inventories and work in progress, as well as the liquidity required for the exploitation of fixed capital in order to maintain the operation.

Determining the basic amount for inventories, work in progress and claims depends on the supply, production and sales capacity and business environment. In this section, the evaluation and estimation of the required investment (based on the price of the base year 1401 SH) is proposed.

No.	Subject	Amount (Million Rials)		
1	Total Fixed Investment Costs	232,930		
2	Total Net Working Capital Requirements	262,442		
3	Total Production Costs (Annual)	9,204,344		
4	Depreciation	20,889		
5	Total Investment	495,372		

Table (10): Cost Estimations

	Table (11): Fixed Capital Estimations (Capital Costs)				
No.		Cost (Million Rials)			
1	Pu	Irchasing land	13,400		
2	Landscaping	and land improvement	11,300		
3	Civil operations a	and construction of buildings	71,000		
4	Production m	52,000			
5	Ser	66,000			
6	Protection and	0			
7	Overhead costs		0		
	Pre-Production Expenditure	Prior to investment studies	490		
	As described in	Project management	6,305		
8	Table (13)	Obtaining technology	1,735		
9	Un	expected costs	10,700		
	Total 232,930				

The primary items included in working capital are:

- Raw materials (domestic and foreign): in order to prevent interruptions in the production flow according to the type of industry, the amount of production, the source and method of supplying materials, the time interval required from the order stage to the stage of receiving the materials, the delivery and transportation time, the amount of raw materials, auxiliary materials and packaging required as one of the working capital items and its storage period is determined for a period of time. In the current plan, the coverage period of material inventory is considered equal to 10 days.

- Manufactured goods and in the process of manufacture: taking into account the stages and methods of production, the time required to manufacture the goods and keep them in the examined warehouse, and the related costs are considered as working capital. In the present plan, the coverage period for goods under construction and manufactured goods is not included.

- Claims of expected funds from sold goods that are collected in a short period of time. The duration of the expected funds must be determined. In the current plan, according to the conditions of the Iranian market, cash is considered.

- Revolving salary for paying the company's current expenses is considered as cash balance or revolving salary in the calculation of capital in circulation based on production costs (without considering the costs of production of raw materials and consumption). In the present plan, the equivalent of 30 days is considered.

	rable (12). Total net working capital negative ments (i rodattion costs)				
No.	Subject	Amount (Million Rials)			
1	Raw Materials Inventory	250,000			
2	Work In Progress	0			
3	Finished Product	0			
4	Accounts Receivable	0			
5	Cash-In-Hand	12,442			
6	(Commercial Accounts Payable)	0			
	Total Net Working Capital Requirements 262,442				





Table (13): Pre-Production Expenditure

No.		Subject	Description	Total (million Rials)	
1		Incorporation	-	0	
2	(Obtaining Licenses / Production License	-	0	
Studying, Consulting, Research and Development, Traveling, Visiting and Participating in Local Exhibitions, etc.		ing, Consulting, Research and Development, g, Visiting and Participating in Local Exhibitions, etc.	One and a half thousandth of the investment costs of the project	490	
4	4 Property Insurance		Equivalent to 2 thousand depreciable fixed assets	450	
5	Si	urvey Fee, Financing, Contract and So On	Expert fee 0.5 thousand, other cases 2.5 thousand	0	
6		Cartography, Supervising	equivalent to 2 per thousand contract costs	270	
		Staff Training	equivalent to 15 days of personnel salary	1,465	
7	Other's	Wages And Salaries During the Construction	equivalent to the salary of 3 people in 12 months	5,683	
		Other Expenses	2.1%		
Total					

8-2- Sales Revenue

The sale of the plan in 1404 (at fixed prices) is expected to be equal to 2.8 billion Rials. This figure will increase in the following years due to the increase in production capacity and will increase to a maximum of 9.6 billion Rials.

	Table (14). Project revenue in the mist of reals of Production Phase (billion mais)									
No.	Subject	Q1	Q ₂	Q₃	Q4	Total 1 st Year	Total 2 nd Year	Total 3 rd Year	Total 4 [™] Year	Total 5 th Year
1	Fullerene C60	551	551	551	551	2,205	3,675	5,145	5,880	7,350
2	Fullerene C70	169	169	169	169	675	1,125	1,575	1,800	2,250
	Total	720	720	720	720	2,880	4,800	6,720	7,680	9,600

Table (14): Project Revenue in The First 5 Years of Production Phase (Billion Rials)

8-3- Length of Production Phase

The construction period of the plan is equal to 24 months and it is considered to start from the beginning of 1403. The duration of the project is considered to be 5 years.

		Table (15): Planr	ning	Horizon
Title	Month	-	year		Length
Project identification	1	/	1402		pha
Beginning of construction phase	1	/	1403		
Beginning of production phase	1	/	1404		
End of production phase	12	1	1408		

Length of construction phase (months)	Start of phase (months)	Length of production phase (years)
24	12	5

8-4- Break-Even Analysis

From an economic point of view, break-even point analysis is an important technique that is used to study the relationship between costs, income and profit. The break-even point is the point at which total cost and total revenue are equal. In other words, it is used to analyze the effect of product volume change on the profit. The break-even point is calculated for 100% of practical capacity (year 1408SH onwards) below.



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Table (16: Project break-even point estimation					
Title	Production 1404	Production 1405	Production 1406	Production 1407	Production 1408
Sales revenue	2,880,000	4,800,000	6,720,000	7,680,000	9,600,000
Variable costs	2,751,040	4,571,011	6,390,982	7,300,967	9,120,937
Variable margin	128,960	228,989	329,018	379,033	479,063
Variable margin ratio (%)	4	5	5	5	5
Fixed costs	53,220	61,845	70,470	74,082	81,302
Break-even sales value	1,188,530	1,296,375	1,439,300	1,501,052	1,629,214
Break-even ratio (%)	41.3	27.0	21.4	19.5	17.0

• According to COMFAR Results

Based on the calculations of COMFAR software, the break-even point including operating and nonoperating costs, is 1.6 thousand billion Rials and it will be achieved in the 17% of the practical capacity.

In the mentioned formula, the break-even point is determined by the relationship between fixed costs and the difference between unit sales price and unit variable costs. Therefore, three practical results are obtained from it:

- The higher the fixed costs, the higher the break-even point.

- The greater the difference between unit sales price and variable operating costs, the lower the breakeven point. In this case, fixed costs are absorbed faster through the difference between unit sales price and unit variable costs.

- One of the break-even points is disproportionate. Since it makes the company vulnerable to changes in production (sales) levels.

8-5- Cost-Benefit Analysis

In project analysis, one of the most common methods is the **Benefit-Cost Ratio**. In this method, the ratio of the current value of possible benefits to the current value of costs is obtained. If this ratio is greater than one, the plan has economic justification for implementation. In terms of this index, the plan has favorable conditions.

Net Present Value is one of the other evaluation methods which is calculated according to the following relationship:

NPV= The Present Value of The Total Cost of The Period of Construction Phase and Production Phase - The Present Value of The Total Income of Construction Phase and Production Phase

NPV= The Present Value of The Fixed Assets Depreciation + Initial Investment - The Present Value of The Future Cash Flows

The **net current value** of the project at a discount rate of 20% is over 455.5 billion Rials, which shows that the project is economically feasible.

One of the other methods of evaluating investment plans **internal rate of return**. In fact, the internal rate of return is the interest rate or the discount rate in which the current value of all the plan benefits is equal to the current value of its expenses.

According to the calculations, the internal rate of return of the project is estimated at 60.7 % and compared to the Minimum Attractive Rate of Return, it is favorable.

Index	Amount	Unit of measurement			
The Present Value of The Total Cost of The Period of Construction Phase and Production Phase	45,413,427	Million Rials			
The Present Value of The Total Income of Construction Phase and Production Phase	45,868,996	Million Rials			
NET PRESENT VALUE (NPV)	455,569	Million Rials			
Cost-benefit RATIO (B/C)	1.01	-			
INTERNAL RATE OF RETURN (IRR)	60.7%	Percent			
NPV RATIO (PI)	1.14	Rial per Rial of investment			
NORMAL PAYBACK	2.36	Year			

Table (17): Project Return Index

Profitability Index (PI) indicates how much economic profit will be obtained for each unit of money invested during the lifetime of the project

Project Investment payback is the period of time required to recover the project investment from net income, measured in years. In other words, it shows the length of time taken for the initial investment to be returned. This index shows the speed of investment return and the amount of project risk coverage. The ROR (simple) of the plan is estimated to be 2.36 years (equal to the year 1406) according to the calculations.

8-6- Sensitive Analysis

In the sensitivity analysis of the plans, the percentage of changes in the internal rate of return (IRR) is measured in relation to the change in some basic parameters and variables. In this plan, the analysis has been carried out by major variables such as sales, fixed and operating costs. Table (18) shows the results of the sensitivity analysis regarding the variables of sales income, fixed assets and operating costs.

8-7-1- Sales Revenue

Changes in sales revenue are mainly caused by alteration in two variables: planned sales amount and product sales price. The results of the sensitivity analysis regarding sales income show; 4% increase in sales revenue of the plan, the internal rate of return will increase from 60.7 % to 116%. On the contrary, in the case of a 4% decrease in sales revenue, the internal rate of return of the project will decrease to -4%.

Table (18): Sensitivity Analysis (Percentage of IRR changes caused by sales revenue, fixed assets and operating costs alteration)

Variation (%)	Sales revenue	Increase in fixed assets	Operating costs
-20%	-73%	72%	310%
-4%	-4%	63%	114%
0%	60.7%	60.7%	60.7%
4%	116%	59%	-1%
20%	319%	53%	-65%

8-7-2- Fixed Assets

The change in the fixed assets is due to the fixed costs of the initial investment alterations. The results of the sensitivity analysis according to the fixed costs of the plan have been done and it shows that in case of an unexpected 20% increase in the fixed capital costs of the project, the internal rate of return will decrease from 60.7 % to 53%. Conversely, if there is a 20% reduction in the fixed capital costs, the internal rate of return will increase and reach 72%.

8-7-3- Operating Costs

The operating costs of the plan is one of the crucial items in terms of sensitivity analysis regarding its changes. Therefore, unexpected and possible changes should be investigated.

The change in project operating costs is mainly caused by changes in raw material, supply, human resource and finally changes in other overhead costs of projects. If these parameters change, it can be as a result of the change in the technical coefficients of product production or the change in their purchase price. The sensitivity analysis indicates that in case of a 4% increase in the operating costs, the efficiency rate of the plan will decrease to -1%. On the contrary, if the total operating costs of the project are reduced by 4%, the internal rate of return will increase to 114%. Finally, the results of the sensitivity analysis show that the current project has a very high sensitivity to changes in sales revenue (changes in sales amount or sales price) and more considerations should be taken in this regard.



As you can see, the slope of the IRR change curve is higher relative to the changes in sales revenue compared to other items while the slope of the IRR change curve is lower relative to the changes in fixed

compared to other items while the slope of the IRR change curve is lower relative to the changes in sales revenue assets, which indicates the greater sensitivity of the plan's internal rate of return to sales revenue and its lower sensitivity relative to operating costs and fixed assets.

8-7- Conclusion

The implementation of the project is planned by taking a plot of land with an area of 2,000 square meters and carrying out construction with an infrastructure amounting to 670 square meters. The total investment in land and building is estimated at 96 billion Rials and the total investment in main and auxiliary equipment is estimated at 129 billion Rials. The total pre-operation costs are also estimated at 9 billion Rials. will be Including this, the total fixed capital required amounts to 233 billion Rials and the total working capital required for the project is 262 billion Rials. The total investment of the project is expected to come from the sources of the company's shareholders.

The project is expected to be sold in 1404 at fixed prices equal to 2.8 thousand billion Rials. This figure will increase in the following years due to the increase in production capacity and will reach a maximum of 9.6 thousand billion Rials. The net profit of the plan will be positive in all years. The profit figure in 1404 is estimated to be 76 billion. The profit will increase in the following years and will reach a maximum of 398 billion Rials. The average annual profit of the plan is 188 billion Rials and the average profit margin is estimated at 3.8%.

The internal rate of return (IRR) of the project is estimated at 60.7% and the payback period (PBP) is estimated at a maximum of 2.36 years. Also, the net present value of the project's cash flows (NPV) is positive and, taking into account the expected interest rate of 30%, is equal to 456 billion Rials.

The liquidity status of the plan and the payment of dividends to the shareholders from the company's funds are also acceptable. Therefore, if the assumptions and predictions are fulfilled, this plan has favorable profitability and according to the financial results obtained, its implementation is recommended. The economic features of the plan are summarized as follows.

Nominal Capacity and Unit of Measurement	Product Name	Title Of the Project with ISIC Code	Title Of the Project
600 k	Fullerene nanoparticles	Fullerene nanoparticles (2411413077)	Fullerene C70, C60 production plan
Required Human Resource (Person)	Equity Shares (Million Rials)	Total Fixed Capital (Million Rials)	Project Duration
15	262,442	232,930	12
B/C	Applicant Available Cash (Million Rials)	Net Present Value (NPV) (Million Rials)	IRR (%)
1.0	495,372	455,569	60.7%
ROI (%)	NPV Ratio / Profitability Index (Rial per Rial invested)	Dynamic Payback Period (Year)	Normal Payback Period (Year)
40	1.14	2.95	2.36
Average Assets Turnover Ratio	Average Net Profit Margin (%)	Average Annual Profit (Million Rials)	Maximum Annual Sales (Million Rials)
6.09	3.8%	172,021	9,600,000

Table (19): Summary of Economic Features

8-8- Estimation of currency rate fluctuation during the project implementation

The currency rate at the time of evaluation is included as described in Table (17). In the present plan, it is an important part of the cost of buying foreign equipment and requires foreign currency. Electrode purchase prices are also considered in terms of currency. But the product will be sold mainly in the domestic market. But domestic sales prices adjust very quickly with exchange rate fluctuations. Therefore, exchange rate fluctuations regarding the purchase of foreign equipment will be compensated to a large extent by the income from sales, and exchange rate fluctuations will have the least impact on the evaluation results. Considering the currency of buying equipment and raw materials, both in the construction phase and in the implementation phase, the following are significant:

- As long as the financing of the project is through foreign currency sources, the number of financial resources required will not change much.

- If the financial resources of fixed and circulating capital are provided through internal sources, the increase in the exchange rate will directly increase the fixed and circulating investment costs and will make it difficult to provide financial resources for the implementation of the plan.

Table (20): Currencies exchange Rate				
Unit of Measurement	Unit Price	Currency		
Rials	413,204	USD		
Rials 451,531 EURO				
Evenance rate of Control Bonk, Evenance Trading System (FTS) dated OF (25 (1402				

rate of Central Bank, Exchange Trading System (ETS) dated 05/25/1402



9) Investment Required, method of fundraising and guarantees 9-1- Foreign Currency Required

The fixed investment costs of the project are in Rials.

Table (21): Foreign (Fixed) Currency Required						
No.	Year	Required Investment				
1	Year 1	0				
2	Year 2	0				
3	Year 3	0				
4	Year 4	0				
5	Year 5	0				

9-2- Model Of Partnership and Fundraising

Participation in the present project and its financing is foreseen in the form of establishing a company inside the country. The total financial resources needed are predicted through the investor's contribution and have not been included in order to implement the facility plan of domestic banks.

9-3- Payback Period

The payback period is the period of time when the initial investment of the plan is compensated from the annual cash funds. The payback period (normal) of the plan is estimated to be 2.36 years (equal to 1406) according to the calculations of CAMFAR.



Dynamic Payback Period of the plan is also estimated at 2.95 years.

10) Incentives, features and benefits of the plan

Some of the financial supports for production companies are loans and bank facilities and tax exemptions which can facilitate the project implementation and provide the favorable condition for investment. In the following, some of these supports will be discussed.

One of the important bank facilities for production units is the long-time repayment period loans up to 70% of fixed capital by the Iran's state banks. This amount can be increased up to 90% for deprived areas if foreign machinery is used. The interest rate of long-term facilities in the industry sector is 23%, which in case of financial prudence, only a part of the interest can be repaid. The repayment period of long-term bank facilities is up to 8 years according to the production plan, the type of technology and the possibility of product exportation.

Another important bank facility is short-term bank loans (6 to 12 months) to use as working capital needed to carry out production processes, which will be provided up to 70% by bank communities. Obtaining short-term facilities to this extent depends on gaining the trust of the operating banks and having an acceptable financial history.

Tax exemption is another incentive for investors to establish factories. To name a few;

- Tax exemption for up to 10 years for implementation in deprived areas
- Tax exemption for up to 4 years for implementation in industrial towns

Investments in the project during implementation is of the investments in developed towns with industrial and mining activities. Since it is located within 30 kilometers of cities with more than 300,000 people, it doesn't have any tax exemption. But if it establishes in another industrial town within a range of more than 30 kilometers from cities with a population of more than 300 thousand people, it can get exempted from Article 132 of the Direct Taxes Law and up to 80% until four years after the date of operation from Article 105 (Direct Taxes Law)1.

So, the effective performance tax rate (annual profit) can be reduced to 4% in the first 4 years, and then it will be considered on the basis of 20%. Obviously; If the project location is in one of the deprived areas, it will be subject to 10 years of 100% exemption.

If the manufactured products (provided that it is in excess of the local market) can be exported to foreign markets, it can be exempted from Article 141 and 100% of the income from exports is exempt from taxes.

Obviously, If the legal personality of the partnership is defined as a public company accepted in the stock exchange market during its operation (in such a way that its shares can be traded with stock brokers), this type of company is subject to Article 143 of the Direct Taxes Law and up to 10% of the company's tax will be exempted.

1 - The exemptions of this article will not include the income of production and mining units located within a radius of 120 kilometers from the center of Tehran and 50 kilometers from the center of Isfahan, 30 kilometers from the centers of provinces and cities with more than 300 thousand people (according to the latest census).





(Attachment Number 2)

Summery Sheet

Project introduction

1. Project Title: Fullerene C70, C60 production plan

- 2. Sector: Production sub-sector: Industry
- 3. Products/services: Graphite electrode
- 4. Location: Khuzestan, Ahvaz city, Ahvaz Industrial Estate No 5
- 5. Project description:

The implementation of the project is planned by taking a plot of land with an area of 2,000 square meters and carrying out construction with an infrastructure amounting to 670 square meters. The total investment in land and building is estimated at 96 billion Rials and the total investment in main and auxiliary equipment is estimated at 129 billion Rials. The total pre-operation costs are also estimated at 9 billion Rials. will be Including this, the total fixed capital required amounts to 233 billion Rials and the total working capital required for the project is 262 billion Rials. The total investment of the project is expected to come from the sources of the company's shareholders.

The project is expected to be sold in 1404 at fixed prices equal to 2.8 thousand billion Rials. This figure will increase in the following years due to the increase in production capacity and will reach a maximum of 9.6 thousand billion Rials. The net profit of the plan will be positive in all years. The profit figure in 1404 is estimated to be 76 billion. The profit will increase in the following years and will reach a maximum of 398 billion Rials. The average annual profit of the plan is 188 billion Rials and the average profit margin is estimated at 3.8%.

The internal rate of return (IRR) of the project is estimated at 60.7% and the payback period (PBP) is estimated at a maximum of 2.36 years. Also, the net present value of the project's cash flows (NPV) is positive and, taking into account the expected interest rate of 30%, is equal to 456 billion Rials.

6. Annual Capacity: 600 kg

Project Status

- 7. Local/internal raw material access: 100%
- 8. Sales: 9,600 (billion Rials)
 - Anticipated local market: 100% Anticipated export market: 0%
- **9.** construction period: 12 months
- 10. project status:
- Feasibility study available?

Yes. The feasibility of the project has been evaluated from different aspects and the results of the feasibility study are favorable in terms of market, engineering, financial and economic indicators.

Required land provided?

Yes. Currently, there is industrial land in Ahvaz Industrial Town 5, and it has been selected based on geospatial criteria for the implementation of the project.

- Legal permission (establishment license, foreign currency quota, environment) taken? Yes. It is possible to obtain legal permits for this plan. In order to settle in the industrial town, the project must obtain legal permits from the organization of industry, mining, trade and environment of Ahvaz city.
- Partnership agreement concluded with local/foreign investor?
 No So far, no partnership agreement has been prepared for the implementation of the project. This plan has the necessary features to attract shareholders' financial resources.
- Agreement with local/foreign contractor(s) concluded?
- No, so far, no agreement or contract has been concluded for the purpose of manufacturing domestic and foreign machinery.
- Infrastructural utilities procured? In case of establishment of the project in Ahvaz Industrial Town 5, the infrastructure facilities of water and electricity, roads, etc. are available.
- List of know-how, machinery and equipment concluded? In this plan, fullerene production is considered by electrical method. In this method, heating of graphite rods is used to produce nanoparticles, and then the produced materials are separated. In order to build the desired devices, research teams with knowledge of nanoparticle production should be used.
- Financing agreement for machinery, equipment and know-how concluded? No

Financial structure



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11. Financial table:

		Local Currency Required		Foreign	Total		
	Description	Million Rial	Exchange Rate	Euro	Currency Required	Euro	
	Total Fixed Investment Costs	232,930	451,531	515,867	0	515,867	
	Total Net Working Capital Requirements	262,442	451,531	581,226	0	581,226	
	Total Investment	495,372	-	1,097,093	0	1,097,093	
-	Value Of Foreign Equipment/Machinery:	0	Euro				
-	Value Of Local Equipment/Machinery:	261,333	Euro	Net present values discounted to:			
-	Value Of Foreign Technical Know-How:	0	Euro				
-	Value Of Local Technical Know-How:	598	Euro				
-	Net Present Value (NPV):	1,008,944	Euro			1403	
-	Internal Rate of Return (IRR):	60.7%	7.				
-	Normal Payback:	2.36	year				
-	Minimum Attractive Rate of Return:	20%	7.				

General information 12. Project Type: new Project ♥ Explanation / Rehabilitation project □ Name / Company name: Address: Khuzestan, Ahvaz city, Ahvaz Industrial Estate No 5 Tel: +98 916 3418900 +98 061 34451004 Fax: Email: mh_rahimzade@yahoo.com Website: Local entrepreneur: Private Sector ♥