

# The Arab Project for Nanotechnology in Water Desalination and Solar Energy

“Industrialization Feasibility of Projects based on Nano Technology for Water Desalination & Solar Energy in the Arab Countries”

## An Overview of Current Initiatives and Business Opportunities

The United Nations  
Economic & Social  
Commission for Western  
Asia (UN-ESCWA)



Abu-Ghazaleh & Co. Consulting (TAG-Consult)  
A member of  
Talal Abu-Ghazaleh Organization



Arab Industrial Development  
& Mining Organization  
(AIDMO)



# AIDMO NANO TECHNOLOGY INITIATIVE



The Arab Industrial Development & Mining Organization (AIDMO) launched a pan-Arab initiative of sustaining small medium businesses focusing on environmentally friendly industries as well as the applications of Nanotechnology

AIDMO Sectoral Committees concluded that the **main priority sectors** are:

**Water Desalination**

**Solar Energy**

# UN-ESCWA, AIDMO, TAG LOU

Consequently, UN-ESCWA, AIDMO and TAG-Consult signed LOU entitled:

## **“Industrialization Feasibility of Projects based on Nano Technology for Water Desalination & Solar Energy in The Arab Countries”**

The objective to identify and promote opportunities for increasing the use and application of nanotechnology in the fields of renewable energy in the Arab region, with particular focus on water desalination and water energy.



# ROLE UNDER THE LOU

Phases	AIDMO	UN-ESCWA	TAG
Phase I: Study to identify project opportunities	Support the efforts with scientific required contributions and review	Develop TOR of study and Provide material on current and potential opportunities	Conduct the study with partners and scientific team
Phase II: Prepare projects proposals	Technical/scientific review from an industrialization perspective	Solicit regional input and Facilitation with local scientific groups. Review and finalize study	Develop mini-business plans (business model canvas)
Phase III: Matchmaking conference	Solicit industrialists and investors Present initiative	Lead organization and relevant outcomes Present project	Host and Solicit regional private sector participation and present business cases

Tasks	Resource	March				April				May				June				July				August				September			
		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26	Week 27	Week 28
Overview of water desalination and solar energy	TAG																												
Identify Arab existing & potential project ideas	TAG, ESCWA																												
Send draft report on the situation overview to Local Scientific Group (LSG) to validate and fill gaps	ESCWA																												
Collect feedback from the LSG	ESCWA																												
Finalize situation overview report	TAG, ESCWA, AIDMO																												
Draft info note for the matchmaking event	ESCWA, TAG, AIDMO																												
Develop the business concept of project ideas	TAG																												
Collect feedback from LSG/AIDMO on investment cost estimates and other needed info	AIDMO, ESCWA																												
Develop concept notes/pre-feasibility studies	TAG																												
AIDMO and ESCWA to finalize pre-feasibility study	AIDMO, ESCWA																												
Match making event preparations	AIDMO, ESCWA, TAG																												
Matchmaking event	AIDMO, ESCWA, TAG																												





# LOCAL SCIENTIFIC GROUP

- Dr. Awni Otoom, Vice Dean- Chemical Engineering Faculty – Jordan University of Science & Technology
- Dr. Farqad Hadaethi, Director Of Applied Scientific Research Center – Royal Scientific Society
- Dr. Akel Awad, Researcher, Royal Scientific Society
- Dr. Motasem Saidan, Director of Water, Energy and Environment Research Center – Jordan University
- Dr. Husam Khasawneh, Director Deputy, Researcher - Water, Energy and Environment Research Center – Jordan University
- Ms. Muna Saqzaw, Researcher – Higher Council for Science & Technology



# BUSINESS OPPORTUNITIES

#	Project	Assigned Expert
1	Layered graphene membrane	Ms. Muna Saqzaw
2	Nanocrystal solar cells (Nano tube TiO <sub>2</sub> perovskite solar cells)	Dr. Awni Otoom
3	Nanocrystal panel coating	Dr. Awni Otoom
4	ECR-Solar-PEM fuel cell hybrid system for green energy and water desalination	Dr. Farqad Hadaethi
5	Nano green materials used in water treatment	Dr. Akel Awad
6	Nano coating for CPV	Dr. Husam Khasawneh
7	Thin film nanotechnology for PV cells	Dr. Husam Khasawneh
8	Nano green corrosion Inhibitor	Dr. Farqad Hadaethi Dr. Akel Awad

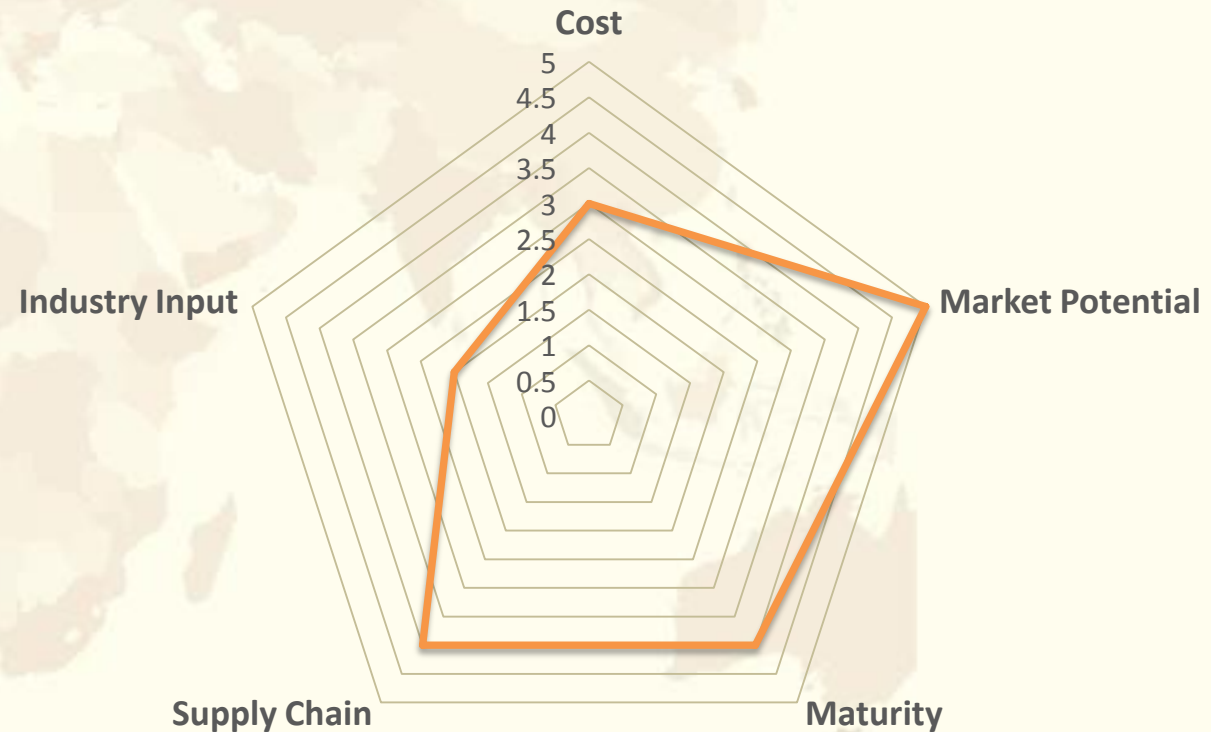


Business Opportunity	Production of Nano tube TiO2 perovskite solar cells				
Description	The Perovskite solar cells are the most promising technologies of the photovoltaic due to the high potential efficiency increase and the ease of production. Production is relatively simple and inexpensive. It comprises of preparation of the glass substatre, then nano TiO2 is deposited to a thickness of 30-nm using spray pyrolysis at 450C using titanium diisoproxide bis9acetyleadetionate) in hydrous ethanol. Then, mesoporous TiO2 layer is deposited by spin coating using 30 nm particle paste (Dyesol 30 NR-D) diluted in ethanol to achieve 150- to 200-nm-thick layer.				
Products & Services	Market Potential	Key Resources	Target Market	Value Proposition	Maturity of Technology
It is aimed to produce a realtively cheap solar panel for companies, small to medium power companies, and end users.	Due to the low production cost when compared to conventional silicon solar panel, it is expected to quickly penetrate local markets, particularly the end users.	type of cells are almost readily available and the main substrate(perovskite) is a wide range of solid chemicals. The equipment is not very sophisticated that include medium and low temperature spin pyrolysis, and clean room On the personnel level, and intermediate qualification is required to perform the manufacturing process.	The key consumers for this type of solar cells will be the home owners and small businesses due to the expected low cost of production	The relatively low cost is considered the main value proposition. Additionally, due to the higher efficiencies obtained, lower surface area is needed if this type of cells is used.	The technology has been developed over 10 years and the rate of progression of overall efficiency is very fast. .
Market Channels		Cost Structure		Revenue Streams	
The main channel of marketing would be through direct communications to the home owners, small businesses, and local banks that can support a short term loans for the end users.		This is difficult to predict, it depends mainly on the production capacity. However, the capital cost and the operation cost is believed to be much less than the conventional Si-based solar panels.		TBD	
Social & Environmental Cost			Social & Environmental Benefits		
The project shall have no social cost, on the contrary, it shall create new jobs. When considering the life cycle assessment of this project, it is believed that this project shall have lower negative impact when compared to the conventional Si-based PV cells			The operating conditions of producing this type of cell is relatively moderate when compared to the conventional Si-based solar cells. Therefore, the GHG production for this type of cells is relatively smaller for the production of this type of cells. Additionally, fostering the first production facility in the Arab world would create new jobs in the production facilities as well		



# EVALUATION OF BUSINESS OPPORTUNITIES

Assessment Criteria	Description
<b>Cost</b>	This criterion captures the R&D and production costs required to produce this technology, as well as the overall estimated investment value.
<b>Market Potential</b>	Represents the market value of commercializing this technology on a large scale. This factors in current market trends and projected penetration potential.
<b>Maturity</b>	Represents the estimated time before the technology can enter the market given current and foreseeable technological limitations.
<b>Supply Chain</b>	Captures the practicality of implementing the technology based on availability, maturity, cost of support, and distribution resources.
<b>Industry Input</b>	Factored in by conducting interviews with industry experts as well as using press releases and industry reports to assess current trends in the IP space.



# MATCHMAKING CONFERENCE

## Objectives

- To connect academia and industry/business sector in building strategic partnerships
- To explore opportunities for such emerging technologies (i.e., Nano Technology) in solving pressing challenges in water desalination and solar energy.
- To facilitate Technology Transfer and commercialization of an innovative components/products used in water desalination and solar energy, which are green and efficient.
- To create new jobs and enhancing sustainable economic development.



# MATCHMAKING CONFERENCE

The event will take place in September, 2017 in Amman. This event offers chances for meeting national and regional partners, from academia, industry, and relevant stakeholders to exchanging ideas for collaborative research, technology transfer and business opportunities.







# Thank you



Talal Abu-Ghazaleh Consulting Co.