Carbon Management and Valorization:

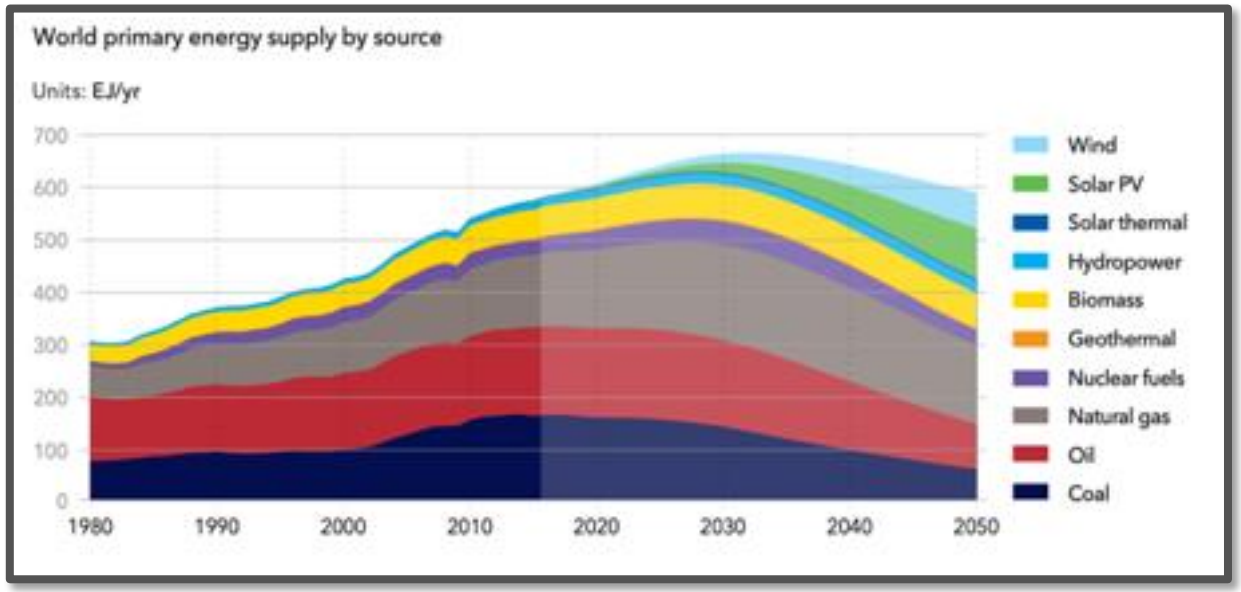
Challenges and Opportunities for the Arab World

Dr. Syham Bentouati – NAFAS International LLC

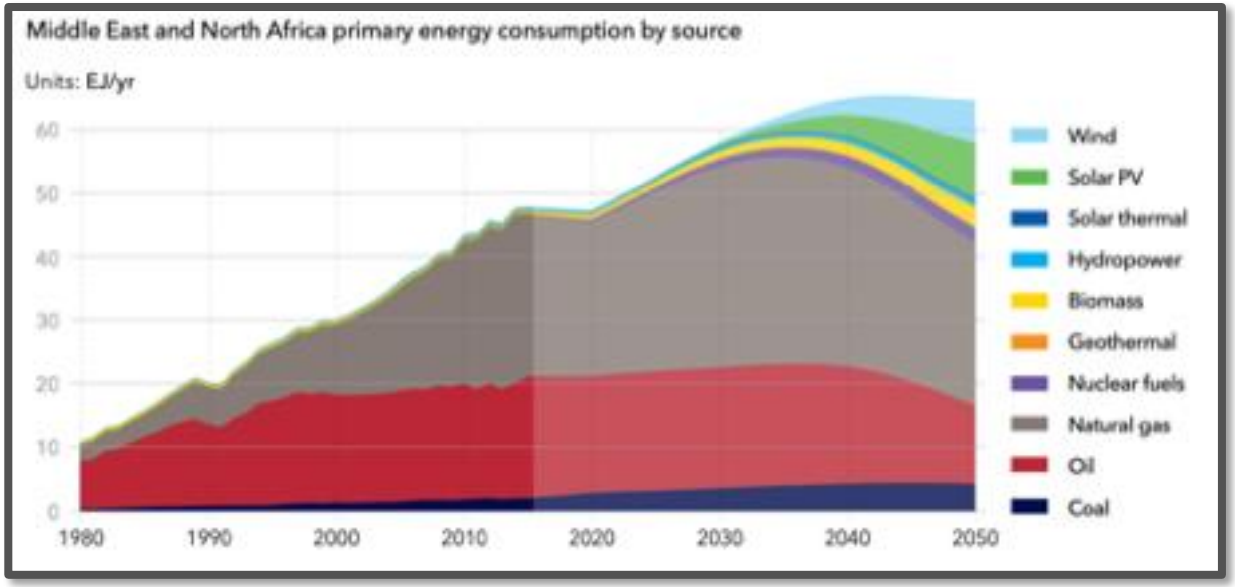
Beirut – 5 December 2018

First Meeting of the "Group of Experts on Fossil Fuels"

Setting the scene



Fossil Fuel will still be a major energy source in the Arab World for quite a wile ....



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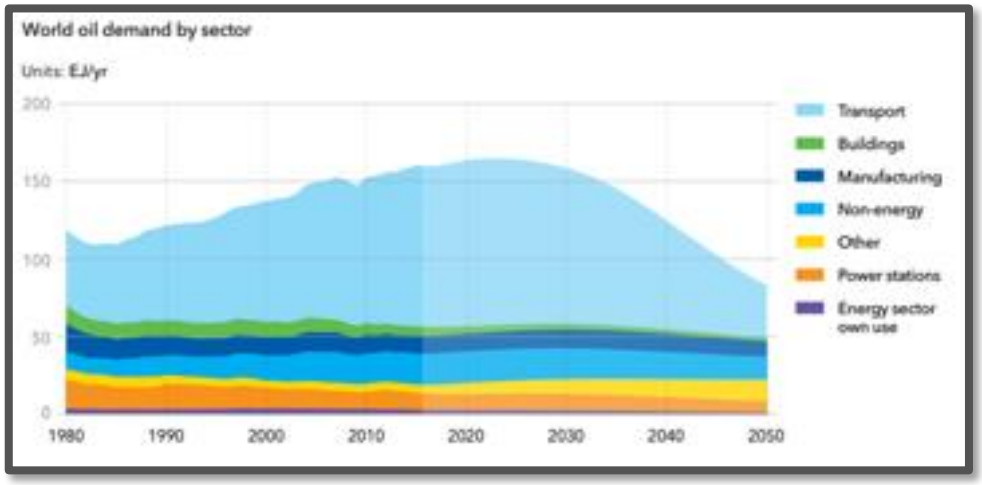
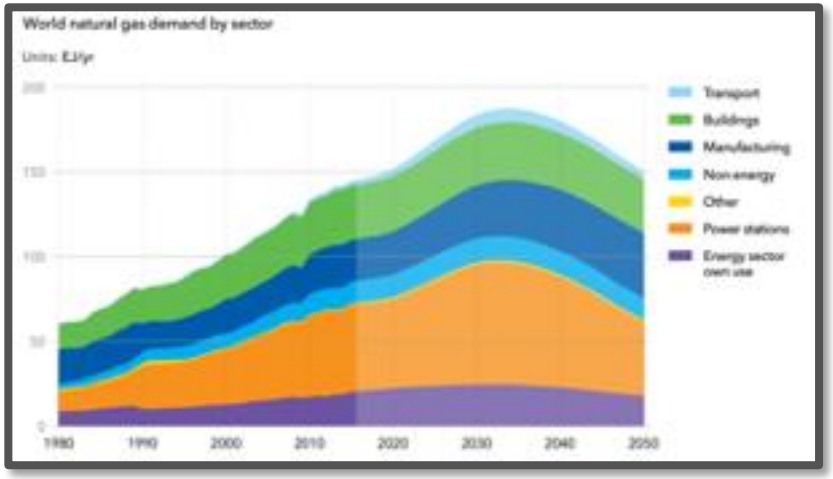
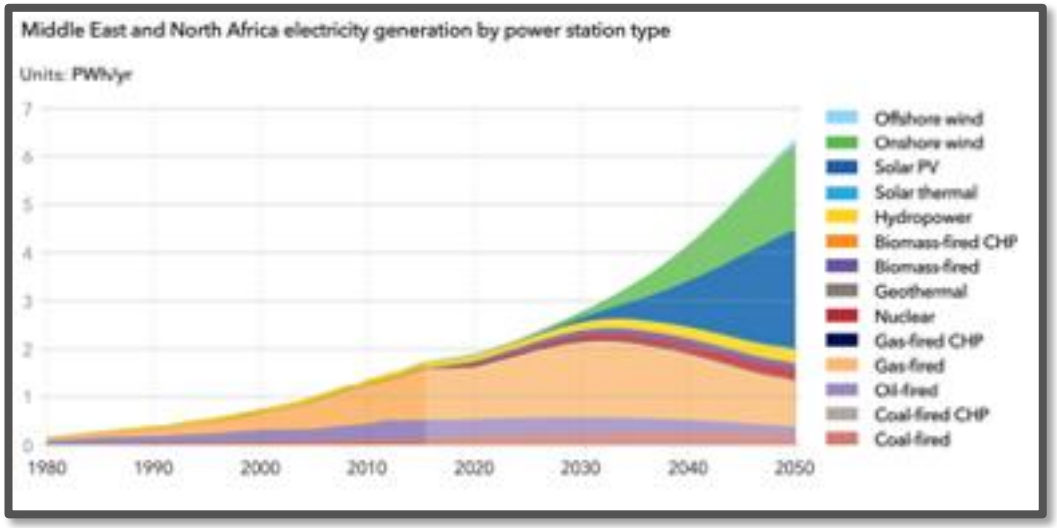
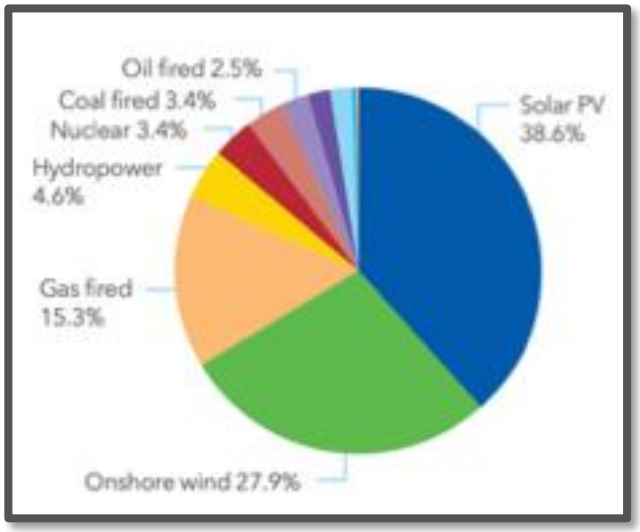
Energy consumption





Fossil Fuel still used for power generation beyond 2050, **with associated emissions**





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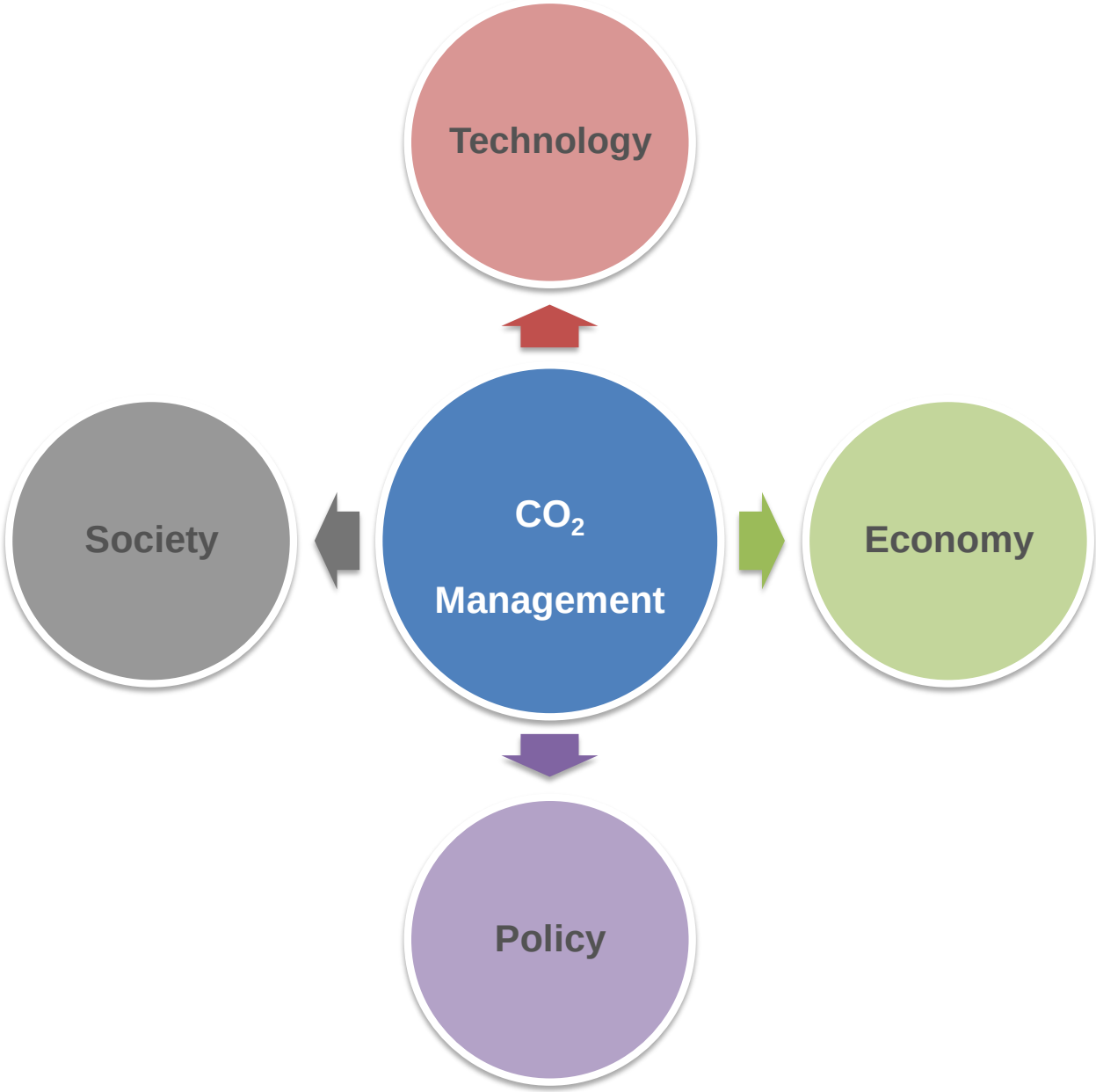
Solution ….

Make Fossil Fuels CLEANER

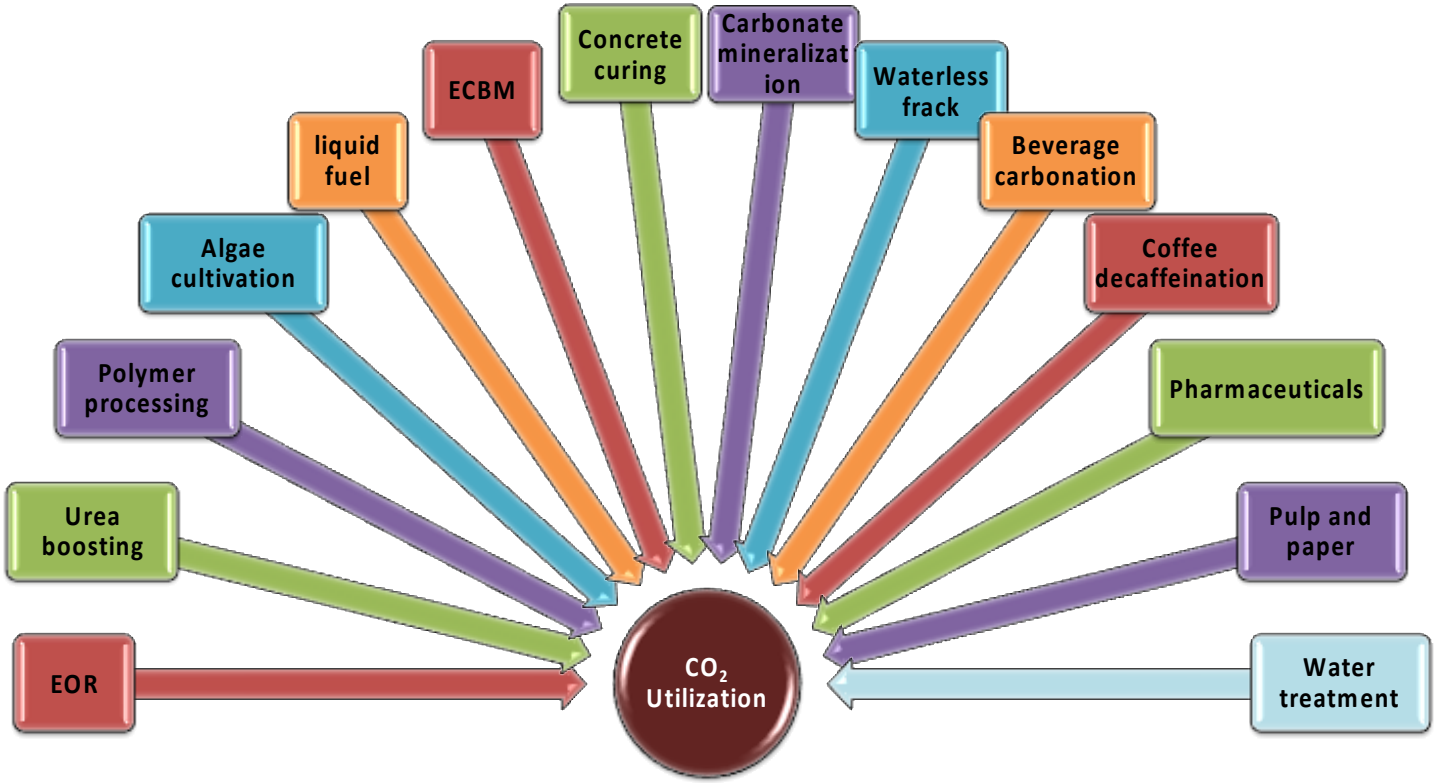
Via a proper …

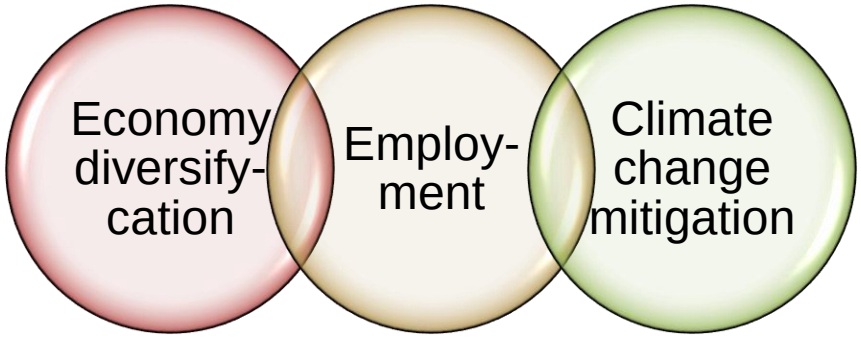
Carbon Management and Valorization

Carbon Management



Carbon Valorization – Opportunities





Carbon Valorization – Arab World Current Status

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Countries	NDCs	NCs	Energy	Oil & Gas	Other Industries
Bahrain	CCUS				Refinery, Petrochemical
Egypt	CCS	CCS	CCS	EOR	
Iraq		CCS	CCS		Cement, Ammonia, Iron
Kuwait		CCS	CCS	EOR	Desalinated water generation
Qatar		CCS			Research Project on CCS technologies
Saudi Arabia	CCUS	CCUS		EOR	Research Projects; Petrochemical
United Arab Emirates	CCUS	CCUS		EOR	Masdar CCS Network, Steel and Oil Field (Al Riyada)

Source: IGES (NDC database); UNFCCC (INDCs Interim Registry) & ESCWA (Report on Carbon Capture Utilization and Storage Challenges and Opportunities for the Arab Region)

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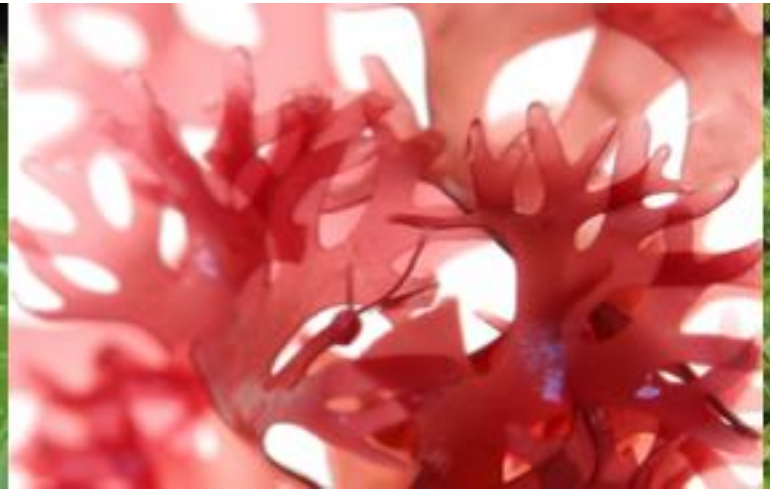
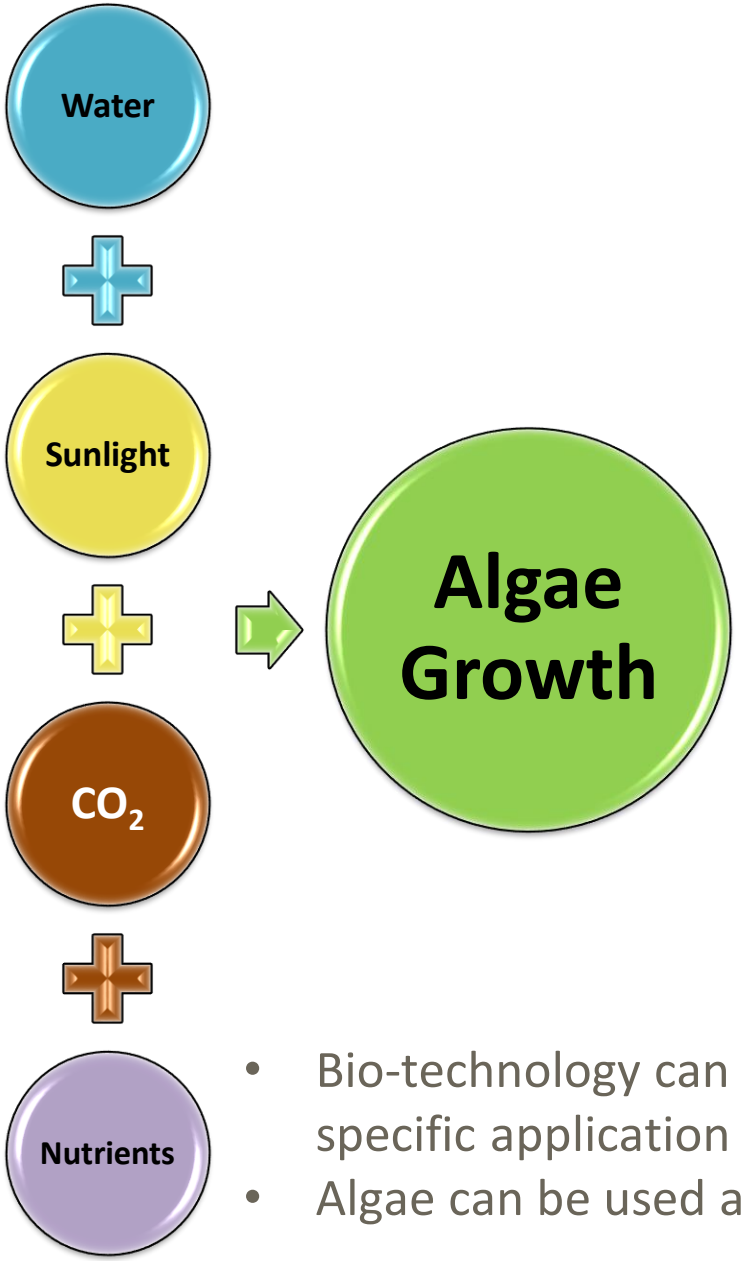
Algae Cultivation



Carbon Valorization – Opportunity Example



In an Oil & Gas Context ….

- Water can be from that produced with hydrocarbons

In a Coal Context ….

- Water can be from the sea

In both cases ….

- Sunlight is abundant in the Arab World
- CO_2 – Captured
- Nutrients can be present in the produced water or can be added

- Bio-technology can be used to select/produce the right algae for a specific application (salinity, temperature, water contents, etc)
- Algae can be used as food, biofuel, for high value pharmaceuticals , etc.

Carbon Valorization – Challenges

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Finance

- Private sector and government need to provide funding until CCUS becomes economical on its own
- Leveraging the power of “economy of scale” via regional collaboration

Technology

- Technology currently resides with developed countries
- Need fair and efficient mechanisms for technology transfer
- Arab countries need to perform joint CCUS research

Policy

- Governments need to have policies that help valorize Carbon, e.g. incentives, carbon pricing, etc.
- Create a regulatory environment that fosters CCUS, i.e. long term commitment and stability to create a sustainable market

Conclusions & Recommendations

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- Fossil fuels are here to stay, at least for the next 50 years, especially in the Arab World
- Fossil fuels need to be “cleaned up” to be more aligned with new legal and environmental requirements as well as people expectations
- Proper Carbon management and valorization can go along way towards helping reduce emissions. At the heart of it is CCUS and CCS
- There are so many options for the use of the captured Carbon, leading to opportunities for employment, economy diversification and environmental benefits
- There are financial, technological and regulatory challenges on the path of a wider deployment of CCUS and/or CCS. They can all be overcome with the right policies, regional and international collaboration and various funding and financing methods

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