

Resource Efficiency and Renewable Energy – Solutions and Technologies Within the WEF Nexus

Access to Finance for Municipalities – Nexus Thinking and Decentralization of Subnational Governments



Shared Prosperity **Dignified Life**



Dr. Syham Bentouati
Managing Director
NAFAS International LLC, OMAN
ESCWA Consultant

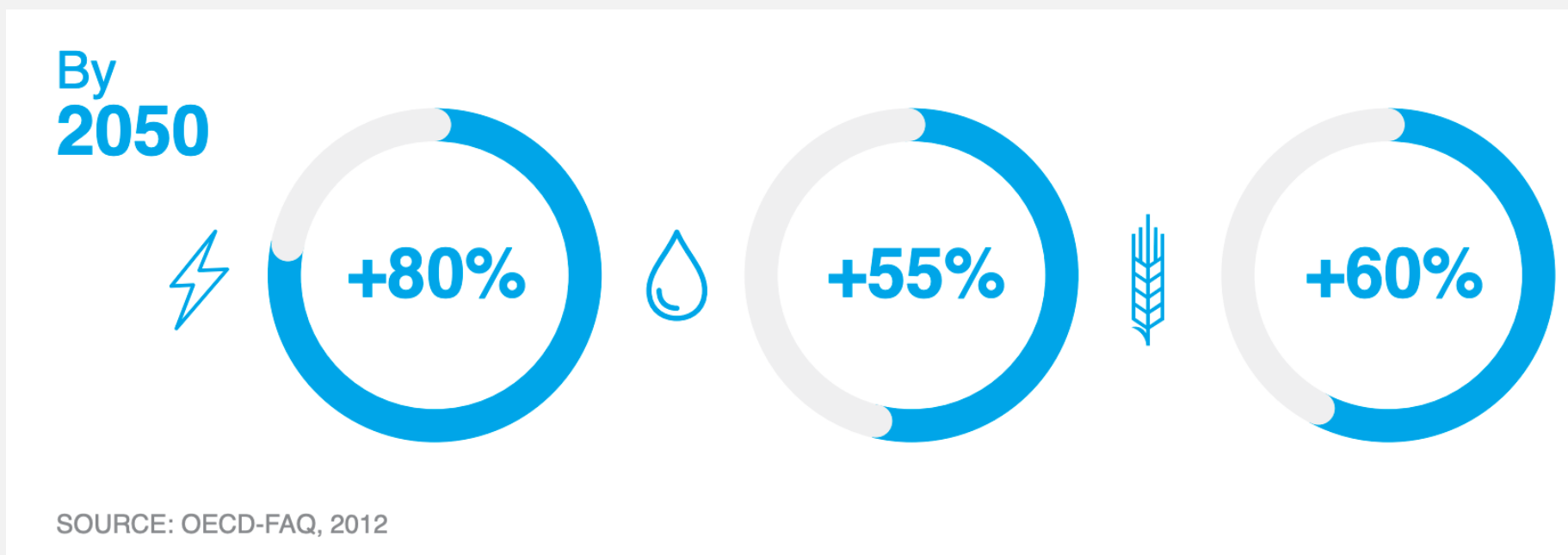
Table of Contents

- Setting the Scene
- Technologies in a WEF Context (Pyrolysis)
- Technologies in a WEF Context (Hydroponics & Aquaponics)
- Technologies in a WEF Context (Other Examples)
- Technologies in a WEF Context (Implementation)
- Key messages

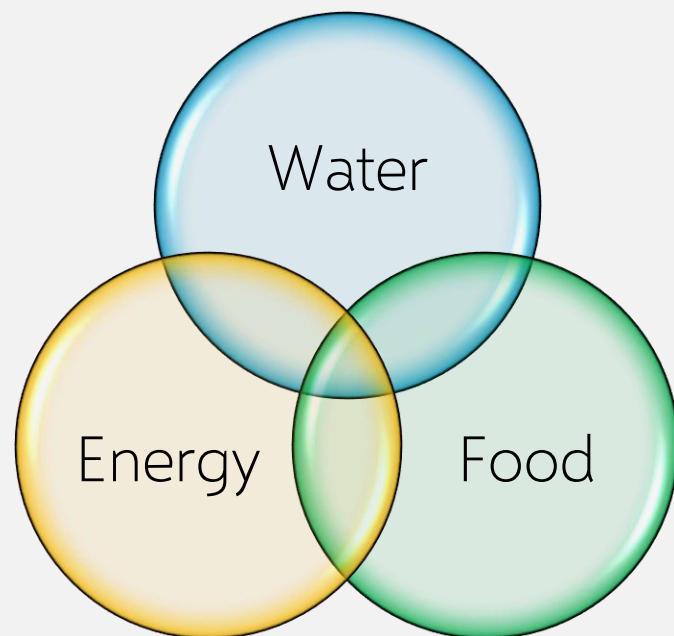
Table of Contents

- Setting the Scene
- Technologies in a WEF Context (Pyrolysis)
- Technologies in a WEF Context (Hydroponics & Aquaponics)
- Technologies in a WEF Context (Other Examples)
- Technologies in a WEF Context (Implementation)
- Key messages

Setting the Scene – Resources Demand Increase



Setting the Scene – WEF Nexus



They are all linked!

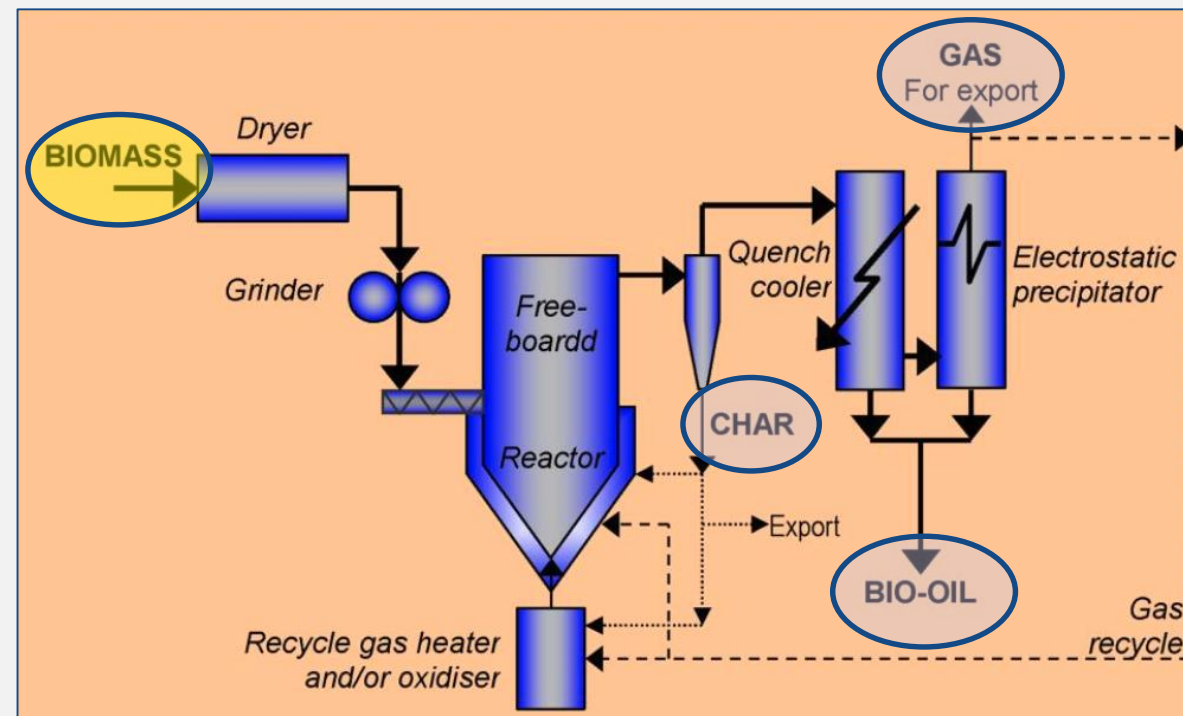
Resource Efficiency is a key starting point
for any Sustainability journey

Table of Contents

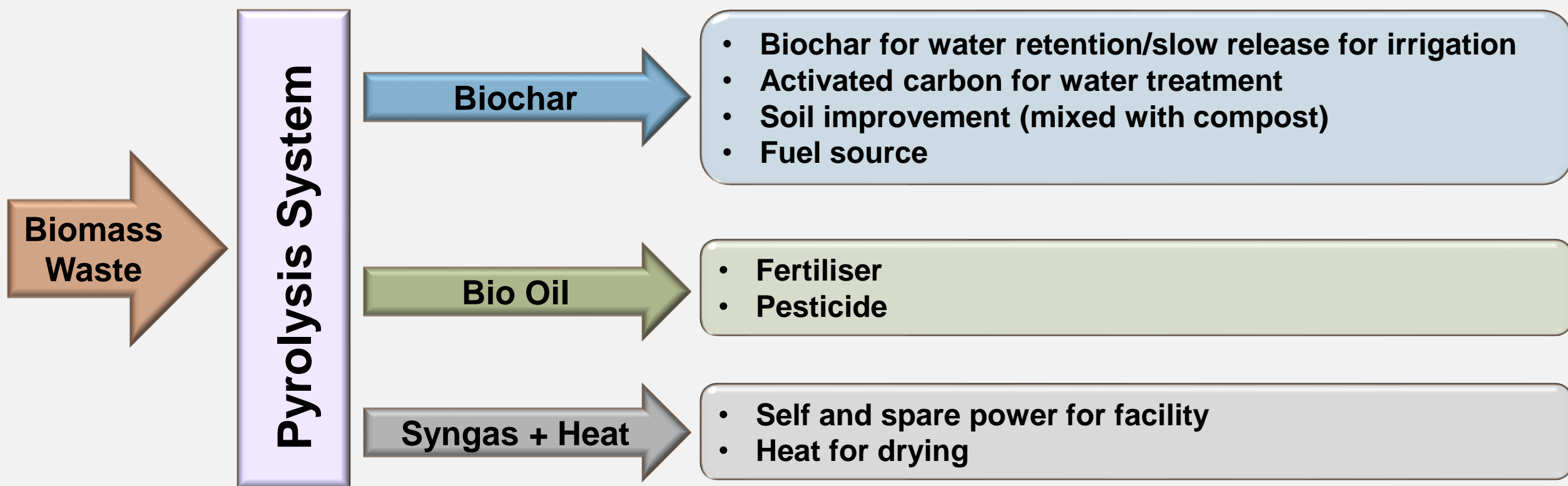
- Setting the Scene
- Technologies in a WEF Context (Pyrolysis)
- Technologies in a WEF Context (Hydroponics & Aquaponics)
- Technologies in a WEF Context (Other Examples)
- Technologies in a WEF Context (Implementation)
- Key messages

Technologies in WEF Context – Pyrolysis (I)

Pyrolysis is the process of heating organic material at high temperatures in the absence of oxygen.



Technologies in WEF Context – Pyrolysis (II)



Technologies in WEF Context – Pyrolysis (III)

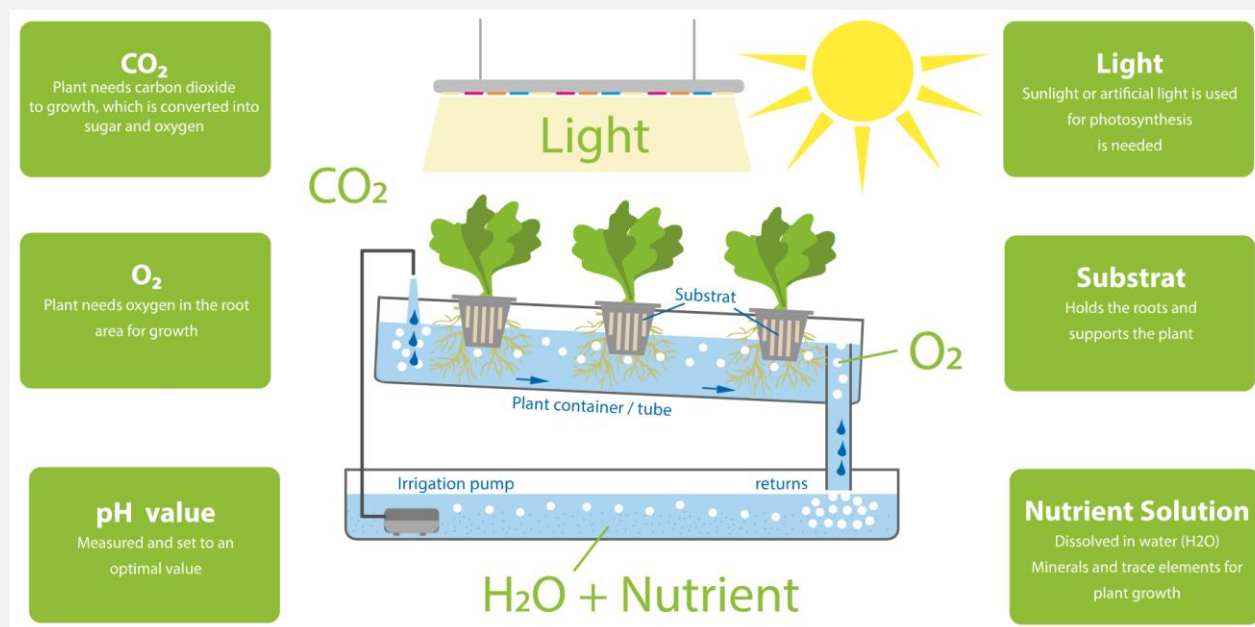
	Slow Pyrolysis	Fast Pyrolysis	Flash Pyrolysis
Temperature (°C)	400 – 500	400 – 650	700 – 1000°C
Residence time	Long 5-30 min	Short 0.5-2s	Very Short <0.5 s
Heating rate (°C /s)	Low 10	High 100	Very high >500
Main products	Gases Char Bio-oil (tar)	Bio-oil (thinner) Gases Char	Gases Bio-oil

Table of Contents

- Setting the Scene
- Technologies in a WEF Context (Pyrolysis)
- Technologies in a WEF Context (Hydroponics & Aquaponics)
- Technologies in a WEF Context (Other Examples)
- Technologies in a WEF Context (Implementation)
- Key messages

Technologies in WEF Context – Hydroponics

“Hydroponics” is an indoor farming technique, where environmental factors are controlled. It is soil-less, saves up to 70% of the water and needs less space. Plants are grown in a nutrient-rich basin of water.



Technologies in WEF Context – Aquaponics

“**Aquaponics**” is slightly different from Hydroponics, in that it involves breeding fish to help cultivate bacteria that is used for plant nutrients

THE **AQUAPONICS** CYCLE

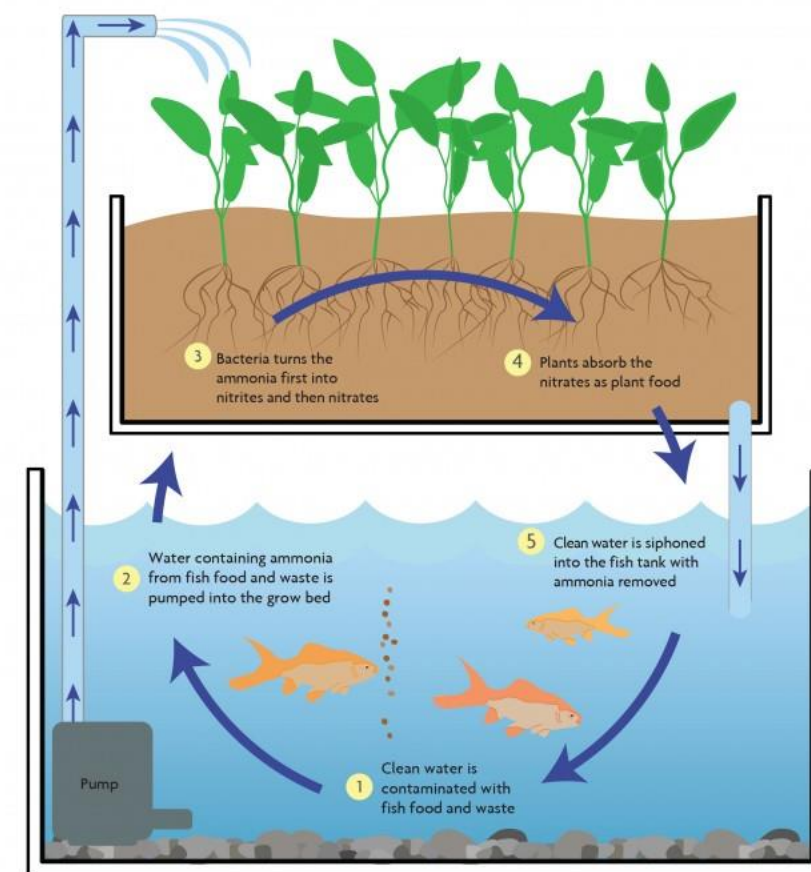


Illustration by Jillian Helvey
Source: aquaponichowto.com

Technologies in WEF Context – Hydroponics / Aquaponics

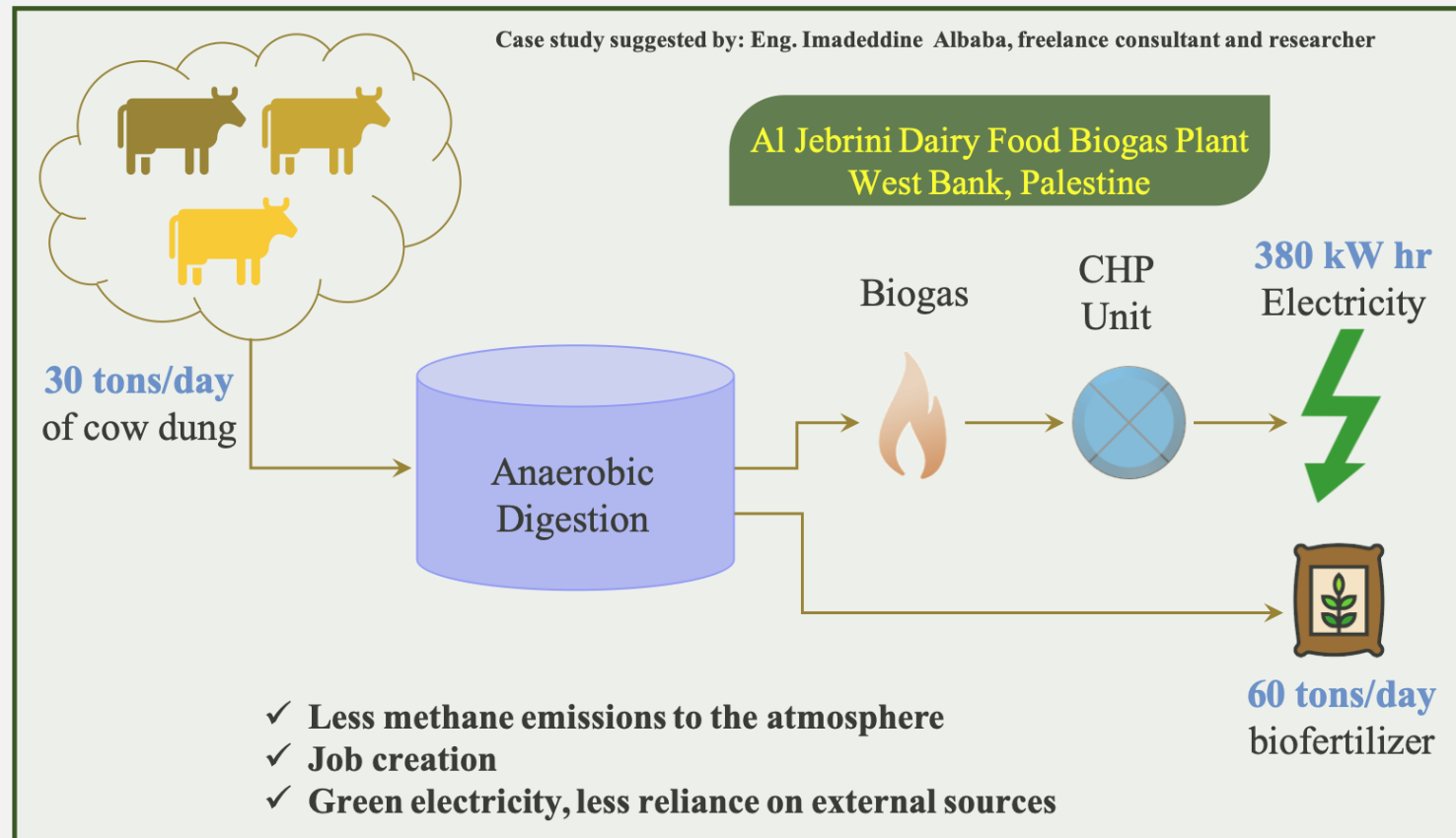


Example: Al Irfan Farms – Oman

Table of Contents

- Setting the Scene
- Technologies in a WEF Context (Pyrolysis)
- Technologies in a WEF Context (Hydroponics & Aquaponics)
- Technologies in a WEF Context (Other Examples)
- Technologies in a WEF Context (Implementation)
- Key messages

Technologies in WEF Context – Other Examples (I)



Technologies in WEF Context – Other Examples (II)



- ✓ **Waste water treatment**
- ✓ **Fossil fuel energy saving**
- ✓ **GHG emissions reduction**
- ✓ **Clean water for irrigation**
- ✓ **Plants for bio-fuel**
- ✓ **New eco system creation**
- ✓ **Job creation**



Table of Contents

- Setting the Scene
- Technologies in a WEF Context (Pyrolysis)
- Technologies in a WEF Context (Hydroponics & Aquaponics)
- Technologies in a WEF Context (Other Examples)
- Technologies in a WEF Context (Implementation)
- Key messages

Technologies in WEF Context – Implementation

Challenges

COST

**No need for
complexity**

**Most can be
designed/
made locally**

Skills

**Capacity
building
programs**

**Cross-
learning**

Proposed mitigation

USE LOCAL UNIVERSITIES SUPPORT

Table of Contents

- Setting the Scene
- Technologies in a WEF Context (Pyrolysis)
- Technologies in a WEF Context (Hydroponics & Aquaponics)
- Technologies in a WEF Context (Other Examples)
- Technologies in a WEF Context (Implementation)
- Key messages

Key Messages

Resource efficiency first!

Many innovative WEF nexus-related technologies are suitable for the Arab region:

Can be implemented in a simple, cost-effective way

Can generate income and create jobs



Shared Prosperity **Dignified Life**



Dr. Syham Bentouati
Managing Director
NAFAS International LLC, OMAN
ESCWA Consultant
syham@nafasinternational.com

Thank you