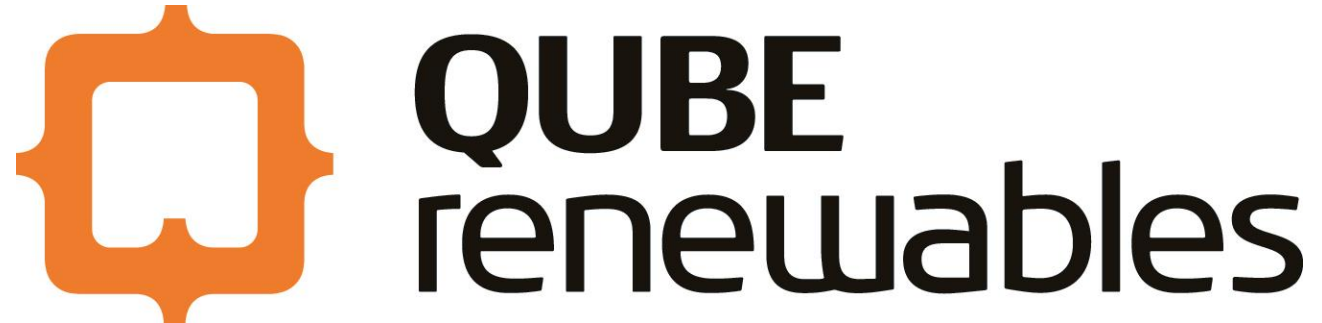




SMALL SCALE AD TECHNOLOGY
CONVERTING YOUR WASTES INTO RENEWABLE ENERGY



IFEAA Event - Deep Dive Manure and Methane May 2024

OUR HISTORY

- 2011 MOD requested an AD solution for Forward Operating Bases in Afghanistan as fuel costs were over \$200 per litre.
- Aardvark EM have worked in the AD sector since 2000's were unable to find anything small-scale on the market.
- 2013 Aardvark EM and UK based engineering firm, Loglogic Limited, established QUBE Renewables. Our first anaerobic digester is still producing biogas today.
- 2021 Qube received an equity position by Blue Planet of Singapore



QUBE RENEWABLES LTD DESIGN & BUILD SMALL-SCALE, LOCALLY EMBEDDED BIOGAS-ENERGY GENERATING SYSTEMS





LagoonQUBE is a flexible, removable cover that operates as a digester, floating on a lagoon or open top tank to collect biogas and importantly rain water, from the slurry



- lagoonQUBE floats and is removable to allow changing levels of slurry and maintenance of the lagoon
- 'Pods' or 'full covers' - the 'pods' each cover 94m², 11.4m in diameter, hexagon shaped and tessellate together to form full or partial covers.
- Compliant with Government Air Quality Ambitions to cover slurry stores
- Mitigates Green House Gas emissions – biogas that is collected from the system would otherwise have been released into the atmosphere
- Rainwater landing on the cover area is captured and pumped from the cover increasing storage capacity
- Biogas from each lagoonQUBE can be collected and used in small scale CHPs, or in biogas boilers for hot water generation.

What is the problem?



Fugitive Emissions:

Ammonia

Methane

Scale

Everywhere



How do we know this:

Lots of study work on lagoons – surprising results, on average 90m² yield 24m³ biogas per day

Key variables: importantly VS content every % is equivalent to around 7% more biogas

Temperature every degree increase is 8% more biogas, until 7°C



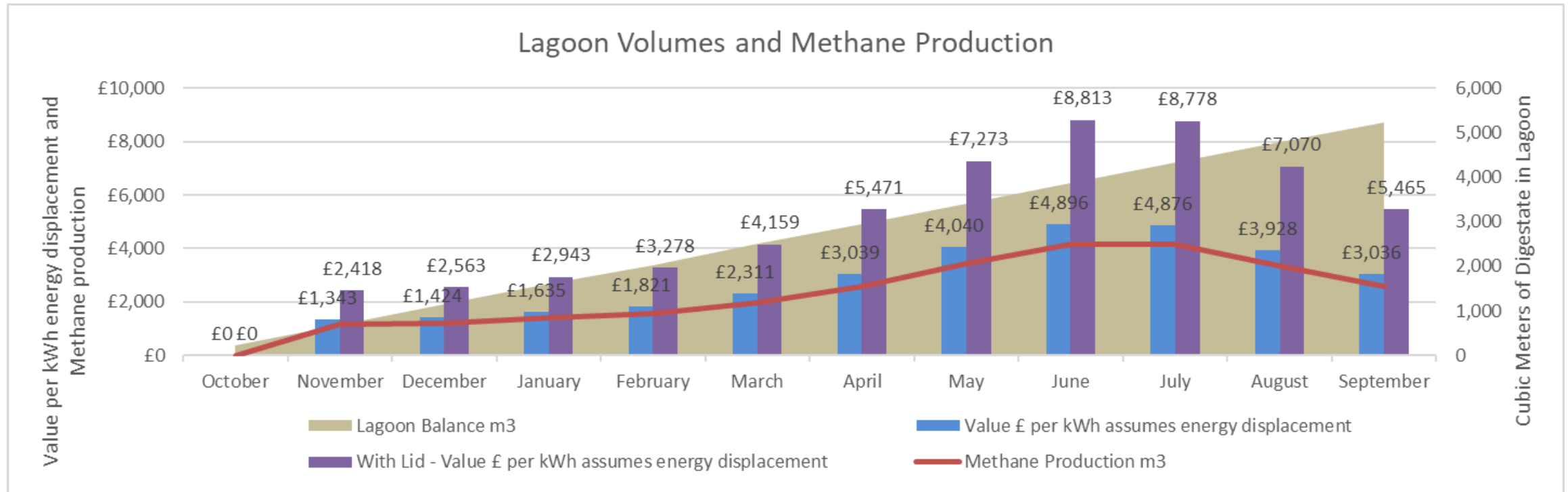
Typical 5500m³ lagoon – say 40 x 40m

Material with 5%DM and 80%VS

Temperature is ambient in Somerset

We estimate that around 46,479m³ biogas emissions per year, based on one empty per year

In energy terms as Electricity this could be worth £27,358 to £58,229 per year*



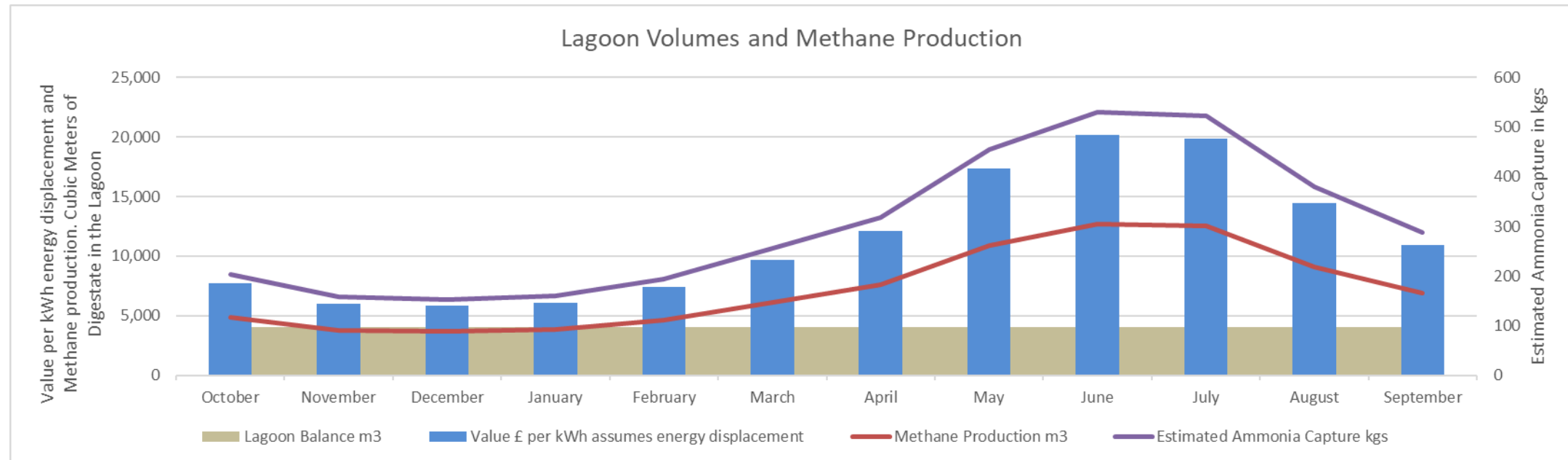
*CHP 27% efficient and Power prices 20p/kWh

Example of Local Dairy in Somerset. 600 Cows in 12 months

Tank – assuming a constant volume of 4000m³

Material with 5%DM and 80%VS

Temperature is ambient for Somerset, UK



What is this worth?

						Value £ per kWh assumes energy displacement	Blended Power and Heat Rate of 0.13 p/kWh		Estimated
Month	Digestate Per Month (t)	Farming Activity	Lagoon Status	Lagoon Balance m3	Methane Production m3	Power at 0.34 Heat at 0.06p/kWh	Consumer Size kW/hr	M3 Biogas per hour	Ammonia Capture kgs
October	1,054	Cropping	Store	4,000	4,864	£7,730	19	13	203
November	1,020	Cropping	Store	4,000	3,761	£5,977	15	10	157
December	1,054	Cropping	Store	4,000	3,652	£5,804	14	10	153
January	1,054	Cropping	Store	4,000	3,825	£6,079	15	10	160
February	952	Cropping	Store	4,000	4,639	£7,372	20	14	194
March	1,054	Cropping	Store	4,000	6,111	£9,711	24	16	255
April	1,020	Cropping	Store	4,000	7,599	£12,076	31	21	318
May	1,054	Cropping	Store	4,000	10,906	£17,333	43	29	456
June	1,020	Cropping	Store	4,000	12,703	£20,187	52	35	531
July	1,054	Cropping	Store	4,000	12,497	£19,860	49	34	522
August	1,054	Cropping	Store	4,000	9,101	£14,463	36	24	380
September	1,020	Cropping	Store	4,000	6,862	£10,906	28	19	287
Total	12,410				86,519	£137,498	29	20	3,616

*CHP 27% efficient and power prices 45p/kWh

Spain – where Government Supports Innovative Fugitive Gas Capture Technology:

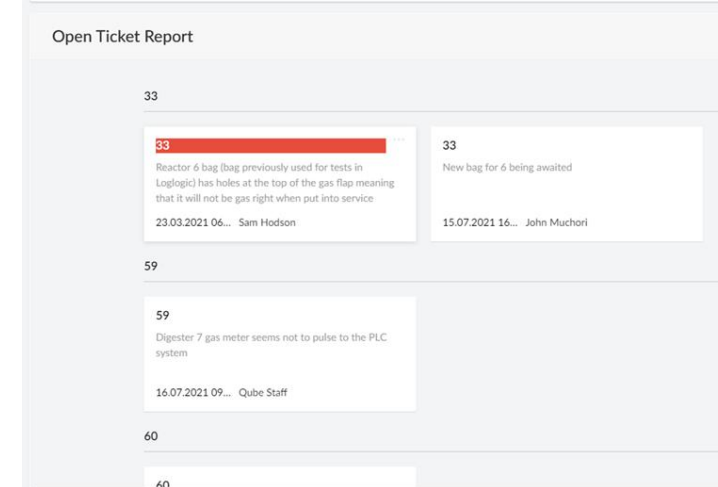
- There are significant Issues with slurry management in the Pig & Dairy Industry in Northern Spain
- QUBE have worked on several sites with existing covers in place to capture biogas and use on farm.
- Structured subsidy system that offers practical support for farmers covering slurry stores and capturing gas



THE QUBE APP

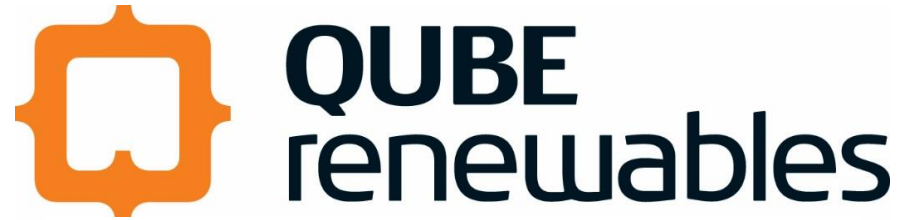
SITE MANAGEMENT

- Manage maintenance tasks and technicians/operators remotely
- Automate run hours and give alerts for service schedules
- Manage site tasks, reminders and sign off
- Easy user interfaces minimising operator errors
- Ticketing system to alert QUBE team of issues, track and update to resolution



Approved Task List										
☐	Task Completion D...	Task Name	Status	Component	Last Compl...	Sub Task List	Postpone Date	Add Sub Task	Complete Task	Frequency Check
	22/07/2021	End Cap Bolt Check - Machine 79	Needs Attention	Maintenance	0000000000		Postpone Date	Add Sub Task	Complete Task	2 - Weeks
	22/07/2021	End Cap Bolt Check - Machine 80	Needs Attention	Maintenance	0000000000		Postpone Date	Add Sub Task	Complete Task	2 - Weeks
	22/07/2021	End Cap Bolt Check - Machine 77	Needs Attention	Maintenance	0000000000		Postpone Date	Add Sub Task	Complete Task	2 - Weeks
	22/07/2021	End Cap Bolt Check - Machine 78	Needs Attention	Maintenance	0000000000		Postpone Date	Add Sub Task	Complete Task	2 - Weeks
	23/07/2021	Machine SD Card Check	In Date	Maintenance	0000000000		Postpone Date	Add Sub Task	Complete Task	1 - Week
	25/07/2021	Chiller Inspection / Cleaning Machine 79	In Date	Maintenance	0000000000		Postpone Date	Add Sub Task	Complete Task	2 - Month
	28/07/2021	Dolav Checks / Greasing	In Date	Maintenance	0000000000		Postpone Date	Add Sub Task	Complete Task	2 - Month

Thank You



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