HOMEBIOGAS LTD – Update Report

21.08.2022

Improved profitability and sales in H1 while regulation supports the expansion of the biogas trend; Signed a significant cooperation agreement with an American company; price target remains unchanged.

Stock Exchange
TASE

Symbol
HMGS

Sector
Technology

Sub-sector
Cleantech

Stock price target
NIS 19.7

Closing price
NIS 9.26

Market cap
NIS 181.9 Mn

No. of shares
19.6 Mn

Average Daily Trading Volume
33 stocks

Stock Performance (since Jan. 1, 2022)
-15.88%

HomeBiogas LTD. (TASE: HMGS) is an Israeli publicly traded company engaged in developing, manufacturing, distributing, and selling domestic and industrial-scale biogas systems that offer a comprehensive solution for waste management, renewable energy creation, clean cooking, fertilizer production, and sanitation.

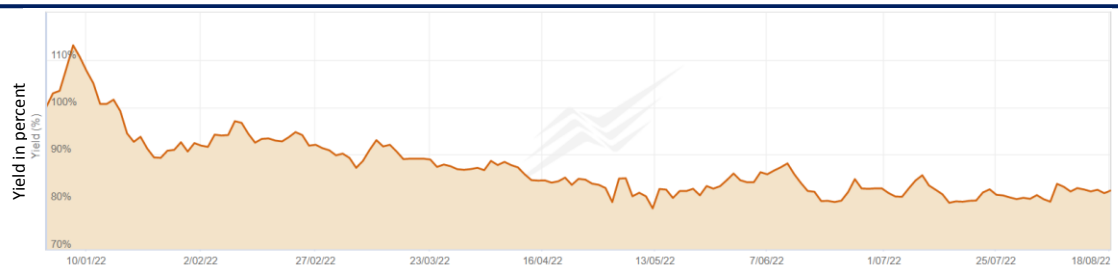
Q2 2022 highlights:

- Signed a cooperation agreement with Rheem, a US tech company, for the development of a water heater for homes and businesses based on the integration between Rheem's water heating systems and Home Biogas' biogas systems.
- Entered into an agreement to install an institutional biogas system in a hotel in Israel operating in one of the most prestigious hotel chains in the world
- Signed an MoU to examine the implementation of home biogas systems with one of the largest franchisees of fast food chains in the world.
- **Completed the first phase of technological integration at the company's test sites.**
- Sales and gross profit growth relative to H1 2021, cash and cash equivalents decreased and operating loss increased.

Recall that the company products address the needs of various markets, such as the cost of handling organic waste created by institutions in the US (~$55 billion); global expenditures on wood fuel for cooking (~$50 billion); the anaerobic digestion market (over ~$15 billion by 2025 with a CAGR of 10.62%); and the global market of new sanitation technologies designed for low-resource settings (over ~$6 billion by 2030). Also, regulatory trends in the US and EU support the company's operations. The recently published IPCC report prompts calls to tackle methane emissions, stating that methane gas has more than 80 times warming power in the near term than CO2. In parallel, prices of carbon credits are rising. **This is a significant tailwind and opportunity for HomeBiogas, which reduces CO2 and methane release in landfills by turning the organic waste into renewable energy on-site.**

In our view, HomeBiogas is advancing significant steps towards penetration into the US market, which is expected to increase the sales pace this year. In the background, continued marketing activity in the institutional market that will yield more significant revenue in 2022 is also expected to affect the share price. In light of the company's meeting our expectations, the price target remains unchanged.

On the next page, we present the main events in the passing months and Q2 2022



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Key events in the passing months and Q2 2022:

- On May 13, the company signed a cooperation agreement with Rheem Sales Company Inc. from the US. The parties will work to promote technological and commercial integration between Rheem's water heating systems and the company's biogas system, in order to create an integrated system in which water heating for homes and businesses will be done using biogas created in the process of treating and breaking down organic waste.
- On May 23, the company entered into an agreement to install an institutional biogas system in a hotel in Israel, operated by an international hotel chain. The system is designed to treat the hotel's waste locally without transportation and to produce renewable energy that will be used to heat water for the hotel's needs.
- On May 25, the company signed a letter of intent with a foreign company that operates as a franchise, one of the largest and best-known fast-service restaurant chains in the world, regarding the intention to install home biogas systems that turn organic waste into renewable energy with local treatment, in three of the customer's restaurants in order to carry out a project to examine and evaluate the system and its function.
- Results from H1 2022:
    - Sales increased 54% to USD 1.9 million.
    - Gross profitability grew from 9% in 2021 to 22% in H1 2022.
    - Cash and cash equivalents decreased from USD 31.3 million in H1 2021 to USD 16.6 million in H1 2022.
    - Operating loss increased from H1 2021 - from USD 3.2 million in 2021 to USD 7.1 million in 2022, mainly as a result of the company's investments in sales and marketing.

For further details on the company and its markets, please read our initiation of coverage report here.

Investment Thesis

HomeBiogas develops, manufactures and markets biogas systems for home and institutional use associated with the field of environment and green energy. The company's products enable local treatment and the use of waste and organic waste to produce clean energy for cooking and heating water and reduce negative health and environmental impacts. HomeBiogas' solutions have a social and environmental impact that enable companies and organizations to increase compliance with their ESG targets.

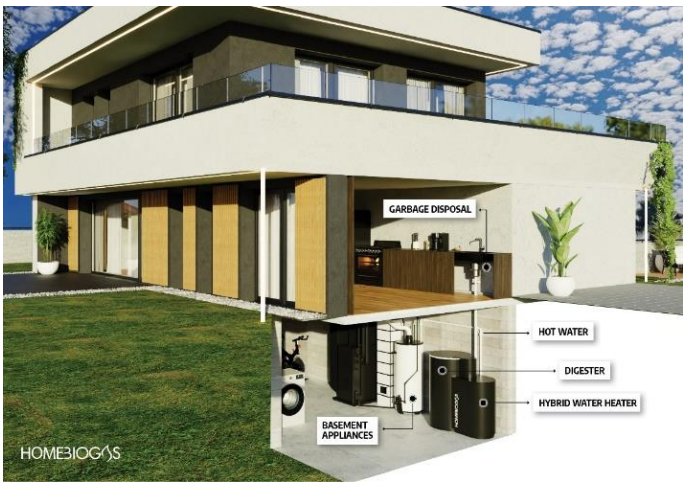
Sustainability and environmental trends, combined with maturity of micro-funding models in developing countries, and increasing cost of managing organic waste, are driving commercial adoption of small and medium scale on-site biogas systems. The anaerobic digestion market was valued at $7.5 billion in 2018 and is expected to surpass $15 billion by 2025 with a CAGR of 10.62% over the forecast period. Also, in light of the crisis following the war in Ukraine European countries have declared an increase in reliance on renewable energies including biogas.

Key driving trends for domestic/industrial scale systems are policies and regulations for on-site food waste treatment. Recently, the company has signed an agreement with the American corporation Emerson (NYSE:EMR), for technological integration and development of an integrated product that will be installed in commercial and home kitchens for the purpose of producing biogas energy from organic waste. Emerson is a market leader in automation solutions for private and institutional kitchens. Home Biogas has completed the first phase of technological integration at the company's test sites.

HomeBiogas provides patent-based domestic/industrial scale anaerobic digestion modular biogas systems that enable people and businesses to turn their organic waste into self-made clean energy on-site. Their vision is to promote sustainability, improve lives, and positively impact the environment by harnessing its expertise in waste treatment and biogas systems. The current line of products for domestic and small farms includes three biogas systems of different sizes - HomeBiogas 2, 4, and 7 cubic meters – which treat organic waste and turn it into cooking gas and fertilizer, a Bio-toilet that turns human waste into biogas (cooking gas), and additional products such as stoves, filters and probiotic tablets.

The company has completed the development of a first prototype of the home system for modern kitchens and expecting first U.S. pilots in early 2023. The organic waste of the modern household kitchen will be ground In the kitchen sink and the company's system will turn it into renewable enrgy for water heating for the

household use. Beyond the benefits of treating organic waste onsite, this system will help alleviate the existing overload on the municipal sewer system resulting from current practice of installing garbage disposal unit (grinders) in the kitchen sinks. Below are pic



As part of its strategy, the company intends to increase its market share in several selected countries, leveraging existing and future agreements with local distributors. In addition, the company plans to offer "Pay as You Go" models, making biogas systems accessible to a larger pool of customers. In the institutional field, the company intends to offer operators of commercial-size kitchens (such as hotel chains) an OPEX-based model for having a small-footprint biogas system that saves costs and meets alternative energy and ESG targets.

We believe that HomeBiogas is on a path for growth and success on a global scale:

- HomeBiogas' novel platform technology and its unique value propositions present great promise in becoming the future incumbent technology for on-site organic waste treatment and sanitation services.
- The company is CE, ISO 14001, ISO 9001 certified and has international product liability insurance. HomeBiogas led to the establishment of a new international standard for household biogas systems, ISO 23590, published in December 2020[1].
- HomeBiogas has received **significant industry recognition**, which speaks volumes about its growth potential; for instance, HomeBiogas is a Phase 1 & Phase 2 SME Instrument winner and was recently granted funds for a pilot project of its institutional system with the Israeli Defense forces.
- **The company has partnered with some of the world's most credible organizations**, including USAID, EU, UN, the International Red Cross, and is a member of the Clean Cooking Alliance. In addition, the company has completed projects with three huge corporations in India, HCL, ADANI and SELCO. Products are sold online to end customers in the developed countries and via a network of 20+ distributors in various countries.

Therefore, we view HomeBiogas as an excellent opportunity for those seeking to invest in sustainable energy and positively impact the environment while improving people lives.

[1] https://www.iso.org/standard/76157.html

1. Company Overview

General

HomeBiogas Ltd., headquartered in Israel, is engaged in developing, manufacturing, distributing, and selling domestic and industrial scale biogas systems that offer a comprehensive solution for waste management, renewable energy creation, clean cooking, fertilizer production, and sanitation.

The company was incorporated in 2012 as a private company. Its shares are listed for trading on the Tel Aviv Stock Exchange since 1 February 2021 (TASE: HMGS) after raising approx. 100 million NIS in an IPO.

Distribution of shareholdings includes 37.89% float, 17.43% institutional, and 44.68% interested parties of which main shareholders are Closed-Loop VC with 16.20%, the three founders with 11.69%, Engie New Ventures with 9.43%, and JS Capital with 7.36%.

Vision

HomeBiogas' vision is to promote circular economy, sustainability, improve lives, and create a positive impact on the environment by harnessing its expertise in waste treatment and biogas systems.

Business Activities and Strategy

The company is developing, manufacturing, distributing, and selling a line of domestic and industrial scale biogas systems for domestic and commercial use that offer a comprehensive solution for onsite waste management, renewable energy creation, clean cooking, fertilizer production, and sanitation. The biogas systems convert kitchen waste, animal manure, and human waste into clean cooking gas, liquid fertilizer, hot water or electricity.

Figure 1: Feed and output of HomeBioGas systems

The company is active in 3 segments- 1) Biogas systems for domestic use/ small farms, 2) domestic / off-grid sanitation, and 3) institutional kitchens.

To date, the company has sold over 15,000 small biogas systems for domestic use in over 100 countries, demonstrating product-market fit for domestic use in both developed and developing markets. In the coming years, the company intends to increase its market share in several selected countries, leveraging existing and future distribution agreements with local distributors in those countries. In addition, the company offers "Pay as You Go" models and making biogas systems accessible to a larger pool of customers.

In the institutional field, the company is in the market penetration phase. The system is tailored to local treatment of organic waste by turning it into renewable clean energy, on site. In this context, the company intends to partner with local partners to offer operators of commercial-size kitchens such as hotel chains, fast food chains, hospitals, military bases, and others an OPEX-based model for having a small-footprint biogas system that save costs of sending organic waste to landfill, reduce energy costs, reduce carbon footprint and meet alternative energy and ESG targets.

IP and Technology

Patents

Patent #1 "Lightweight assimilable appliance and respective method for production of biogas and liquid fertilizer" Description: First-generation system for domestic biogas, with a flexible digestion container, hung from an external rigid scaffolding. Published: International (2014), Israel (2019), USA (2017), Europe (2017), Australia (2016), South Africa (2017), China (2018), Nigeria (2015) Expire: December 2033	Patent #2 "Lightweight appliance with exoskeletal support respective kit-of-parts and method for production of biogas and liquid fertilizer" Description: Second-generation system for domestic biogas, without external rigid scaffolding, but with external flexible casing. Published: International (2019), USA (2019), Australia (2020), China (2019), India (2018) Expire: December 2037

Trademark

The company registered its name and logo in the US as a trademark.

Grants

The Israeli Innovation Authority backs the company since its inception. During the years 2012-2020, the company received a total of $1.3 million.

Recently, in April 2021, the company was granted funds for a pilot project of its industrial system with the Israeli Defense forces.

HomeBiogas is a Phase 1 & Phase 2 SME Instrument winner, supporting the successful commercialization of HBG 7, launched during the SME Phase 2 project. The company was granted €1.6 million by the European Horizon 2020 SME Phase 2 program in 2017 to develop an institutional biogas system. A second project under the Horizon 2020, part of the Consortium program, for granted €167,000 in May 2018.

Safety and Standards

The company is CE, ISO 14001, ISO 9001 certified and has international product liability insurance. HomeBiogas led to the establishment of a new international standard for household biogas systems, ISO 23590, published in December 2020[2].

Prizes

- ✓ Finalist for 2020 "High-Tech for Humanitarian Aid" Prize (2020)
- ✓ Chivas Venture, UK (2020)
- ✓ Vegas hardware retail choice for innovation (2019)
- ✓ National ENERGY GLOBE Awards, Austria (2018)
- ✓ Green Challenge, Netherlands (2017)

Distribution & Partnerships

The company has partnered with some of the world's most credible organizations, including USAID, EU, UN, the International Red Cross, and is a member of the Clean Cooking Alliance (www.cleancookingalliance.org). Products are sold online to end customers in the developed countries and via a network of 20+ distributors in various countries, including India, Kanya, US & Canada, Costa Rica & Panama, Philippines, Nepal, Thailand, Laos, and Brazil and in a direct sale through its subsudery in Kenya.

Offices, Facilities, and Employees

As of the report date, the company has no real estate or fixed assets of material scope and is renting two facilities; one is used for administrative, marketing, and sales purposes, and the other facility is used for storage, quality control, and packing finished products prior to shipment. Workforce is about 90 people.

[2] https://www.iso.org/standard/76157.html

2. Products Overview

Domestic products

Biogas systems

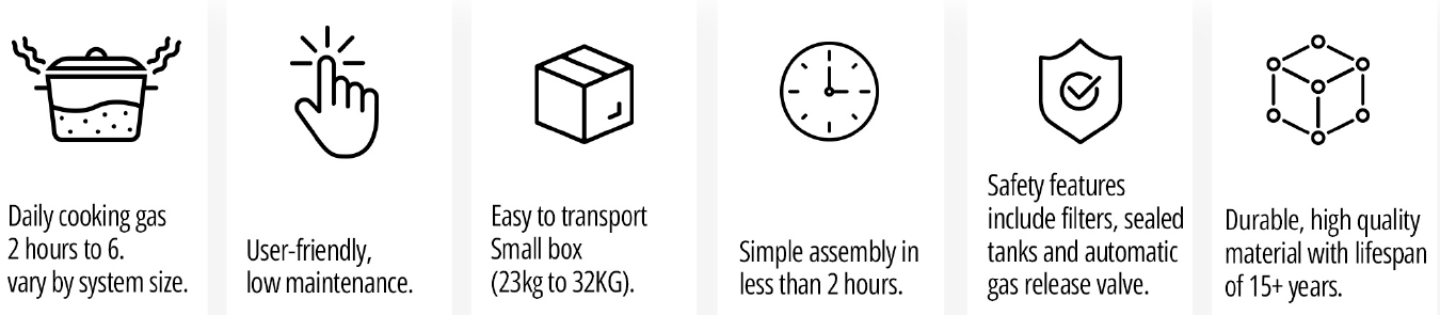
The initial prototype was piloted in 2014. In 2016, the first generation became commercially available.

The current line of products includes 3 biogas systems (HomeBiogas 2, 4, and 7 cubic meters sizes) built from 3 core elements:

1. A welded inner liner designed to contain the gas and digested materials
2. An outer liner specially designed for strength, stability, and UV resistance
3. Injection moldings, including the system's piping, inlet, and outlet

The domestic systems are made of 100% recyclable materials and have a patented mechanical pressure generation mechanism (ensuring that the filtered gas pressure in the storage tank remains constant and controlled).

Key features include:



Bio-toilet

Treating toilet waste, 100% off-the-grid, and only use 1.2 liters of water per flush from a standing source (no electricity is required).

Additional products include cooking stoves, probiotic tablets, and filters.

Institutional products

The company is in the market penetration stage a line of on-site organic waste treatment systems for commercial and industrial kitchens of public institutes, companies, hotels, restaurants, and food complexes.

The systems use an anaerobic digestion process to decompose the organic waste into biogas and organic liquid fertilizer. The biogas is used for water heating or electicity generation, and the liquid is best used as a bio-fertilizer. The kitchen waste is fed to the grinding unit and from there transferred to the anaerobic digester container; the waste is broken down in an anaerobic process; the generated gas is converted immediately into hot water; and the hot water serves the needs of the kitchen.

Key features and advantages

- Affordable Biogas-as-a-service model: all included per use pricing model, based on monthly payments with no additional fees for installation and services. End-users save on waste management costs and renewable energy generation from the first month of use
- Small footprint (starting at 20 m^2)
- A safe and sealed system with no odor
- Fits outdoors under any environmental conditions Internal temperature control system
- Certified technology
- Automated waste sorting
- Easy transportation and installation
- Automatic real-time monitoring and remote control
- Convenient user interface located inside the kitchen

The product portfolio includes a few systems in pilot stages, with scalable volume capacity and size from 100kg per day to 1,000 kg per day, expected to be commercially available during 2022.

3. Market Overview

Global Sustainability Trends

Sustainable Development Goals (SDG's) adopted at the 2015 United Nations Summit provide the principles, framework, and targets for all stakeholders across the value chains to identify key development areas to enhance and seek continual improvement regarding to sustainability, good health, well-being, and climate action.

Figure 5: The 17 United Nations Sustainable Development Goals (SDG's)

HomeBiogas has a strong value proposition matching with 8 of the 17 UN goals, making it attractive and highly-relevant to commercial companies, organizations, banks, and governments.

EU Circular Economy Plan

The updated European Commission's Circular Economy Action Plan from March 2019 is committed to the United Nations SDGs. The plan involves the entire value chain and major focus areas relevant to HomeBiogas: Waste reduction at source, Diversion from landfills, and Sustainable business best practices. One of the targets for 2035 is the reduction of municipal waste landfilling volume by 50%.

Anaerobic Digestion Market

The Anaerobic Digestion market was valued at $7.5 billion in 2018. It is expected to surpass $15.0 billion by 2025 with a CAGR of 10.62% over the forecast period.

According to the American biogas council, investment in new biogas systems in 2018 totaled $1 billion. In recent years, investments in the US biogas industry have been growing at an annual rate of 12%. Although there is already a wide application of biogas technologies worldwide, the industry is still in its initial stages of development. The biogas industry can be analysed in 3 broad categories: micro digesters using biogas, scale digesters generating electricity, and scale digesters producing biomethane[3].

Micro digesters

Biogas from micro-scale digesters is most often used in stoves for cooking or heating, displacing solid, high emission fuels like firewood and charcoal, and play an important role in developing countries, where they are an integral part of farming, waste management, and energy security.

The World Biogas Association estimates that close to 50 million micro-scale digesters are operating worldwide, with 42 million operating in China and another 5 million in India, and some 700,000 installed in the rest of Asia, Africa, and South America[4]. Flexible (balloon/bag digester) systems such as HomeBiogas products are relatively new in the market and have a superior value proposition because it is quick to install (DIY/pre-fabricated), has lower costs and innovative payment models.

Clean Cooking and Sanitation Market

Clean cooking

According to World Bank, the UN, and the FAO reports, between 2.4 and 3.5 billion people worldwide do not have access to clean cooking fuels and technologies. These people use inefficient open fires or simple cookstoves today and rely on wood-based fuel, including wood, charcoal, and coal, for cooking.

There are many negative impacts of these types of fuels. Environmentally, inefficient fuel production and consumption lead to increased GHG emissions, solid fuel cooking is tied to catalytic warming effects of black carbon emissions, and forest degradation/deforestation due to fuel collection and production. In terms of health, a broad range of health conditions are associated with indoor air pollution; hundreds of thousands of burns, deaths, and injuries are associated with traditional fuels/cooking appliances; and firewood collection leads to chronic and acute physical ailments. Economically, there is a large amount of avoidable spending on fuel, and lost opportunities for income generation on time spent collecting fuel and cooking.

[3] RENA (2017), Biogas for domestic cooking: Technology brief, International Renewable Energy Agency, Abu Dhabi
[4] World Biogas Association, Global Potential of Biogas, 2019

Costs are the main barrier for adopting clean cooking solutions. The lack of progress in expanding access to clean, modern cooking costs the world more than $2.4 trillion each year, according to a report released in September 2020 by the Clean Cooking Alliance, the World Bank, and the Modern Energy Cooking Services program. The report estimated that US$150 billion is needed annually to reach universal access to modern energy cooking services by 2030.

Reports found that the problem is not a lack of consumer expenditure but the need for business models and technologies that make superior alternatives affordable and accessible. Over the last decade, the industry is transitioning from aid-based to becoming commercially viable. To lower barriers and support the adoption of clean solutions, the World Bank's recently announced $500 million Clean Cooking Fund, housed under the Energy Sector Management Assistance Program (ESMAP)[5].

Sanitation Market

Sanitation is a basic necessity that contributes to better human health, dignity, and quality of life.

The UN's SDG 6 water and sanitation monitoring program reports that in 2017, over 2 billion people lack basic sanitation services, with 673 million people still practiced open defecation, with 91% live in rural areas [6].

The result is that the poor are deprived of decent and dignified lifestyles leading to the deterioration of health, wellbeing, and human environment. According to the World Health Organization, poor sanitation and hygiene practices contribute to over 820,000 deaths from diarrhea annually.

Small-scale off-grid sanitation solutions aim to deliver services for the safe disposal of human urine and feces. Off-grid solutions include traditional and improved latrines (various kinds of pits), container-based sanitation (CBS), flush toilets connected to septic tanks, and various wastewater collection and treatment facilities, such as fecal sludge management technologies.

Lack of proper sanitation costs the world an estimated $223 billion every year. It is estimated that the annual market value for new sanitation technologies designed for low-resource settings, such as the HomeBiogas Bio-Toilet, could potentially reach more than $6 billion globally by 2030[7].

[5] https://www.worldbank.org/en/results/2020/11/10/accelerating-access-to-clean-cooking-the-efficient-clean-cooking-and-heating-program-and-the-clean-cooking-fund
[6] https://www.unwater.org
[7] Bill & Melinda Gates Foundation

Food Waste Management

A United States Environmental Protection Agency (EPA) report from July 2020 on Wasted Food Measurements estimated that the Hospitality and Institutional sectors, which are only responsible for 25% of total food waste[8], generated 24 million tons of waste in 2016. Potential solutions to process food waste include centralized (such as large AD facilities at landfill locations) and decentralized systems (small-scale systems near the kitchens).

Key drivers and restraints – micro, small, and medium-scale systems

Key drivers include **price increases and limited availability of alternative energy sources** such as coal, wood, gas, and polluting fuels in developing countries; **increasing awareness of the health damage** of cooking with charcoal or wood; **a growing amount of government regulations** that drive organizations and institutions to look for alternatives to organic waste treatment – including the Global Methane Pledge announced at COP26, which committed signatories to reducing their overall emissions by 30% by 2030, compared with 2020 levels; **support by government aid organizations and subsidies** including the UN, World Bank, and many other NGO and commercial organizations; the **price and availability of fertilizers**; and the **Solar PV "Pay as You Go" model maturity**, paving the way for growth and adoption scale in the clean cooking and sanitation domains.

The key restraints include **prices and funding alternatives** that reduce the number of customers that can afford to purchase the systems; **poor operational / logistics infrastructure** for delivering systems in rural areas; **local taxes and fees** imposed by the governments increase prices; and **limited partners and local talents** are required for demonstrations, installations, and services.

[8] https://www.epa.gov/sites/production/files/2020-06/documents/food_measurement_methodology_scoping_memo-6-18-20.pdf

4. Competitive landscape

Competitors

There are hundreds of competitors in the 3 segments that HomeBiogas is active in, mostly very small and local companies. Some of the more notable players are: Sistema Bio, ATEC Bio, Puxin, Power Knot, QUBE Renewables and SEaB Energy. For further details read our initiation of coverage report here.

5. Strategy & Growth Opportunity

Product and Market Growth Strategy

HomeBiogas plans to reduce product production costs for the 2, 4, 7, and the Bio-Toilet. It will expand product offering and differentiation by developing different biodigester models for developing and developed markets. The company will also offer local manufacturing in target countries to decrease costs, increase capacity and shorten supply time. The current annual production capacity is about 20,000 biogas systems. HomeBioGas is committing to a clear development roadmap for the institution systems (HBG 300/500/1000) during 2021-2022 to be commercially ready in 2022 and 2023. They will offer a “smart home” premium waste to energy solution for houses in developed markets. Completed the POC stage and now in the advanced development stage.

Business Approach

HomeBiogas operates on a B2B2C model, recruiting local employees to provide full support for distributors and their customers. It offers customized market support strategies with a “Pay as you go” model in developing countries. HomeBioGas leverages carbon credits, mainly of the institutional systems, for additional revenues or reduce leasing prices to customers. Each unit saves 1,000 – 1,200 tons of annual carbon emissions, currently values at around $5,000-10,000.

The company’s distribution and partnership channels include online sales, corporate social responsibility (CSR) projects, humanitarian aid projects, government-funded projects and subsidies, international development projects, and additional distributors (B2B) in target countries.

Business Models

Domestic products. The company currently offers one-time sale of biogas systems and recurrent sales of perishable items such as filters and probiotic tablets. The company plans to launch a Pay as You Go model in developing countries and one-time sale of a biogas systems and recurrent sales of perishable items such as filters and probiotic tablets (via online) in developed markets.

Institutional systems. The company plans to offer Leasing and Pay Per Use (per volume of waste and energy) models.

Summary of the Market Opportunity

Domestic

- Developing countries – some 250 million families in rural and urban areas that do not have access to sanitation and clean cooking.
- Developed countries – tens of millions of environmentally-sensitive families living in rural areas that are not connected to a central sanitation system.

Institutional

- There are over 500,000 medium and large-scale food service facilities in the US and EU markets, of which 60,000 can be targeted as short-term opportunities, driven by stringent state and local policy and regulations for on-site waste management.

Appendix 1: About Frost & Sullivan

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