BUSINESS PLAN

IMPLEMENTATION OF THE NATURAL GAS ULTRA EFFICIENT BURNER FOR RESIDENTIAL HEATING IN NEW YORK CITY

CONTENTS

SUMMARY……..…2

PROJECT OWNERS' PROFILE……..… ……..……..…4

THE MARKET AND THE PRODUCT...……..……..……..5

UEB MANUFACTURING AND INSTALLING…….....8

PROJECT'S ECONOMIC EFFICIENCY……..…….....12

SUMMARY

The business plan sets out the comprehensive disclosure of the production, installation, and maintenance of natural gas Ultra-Efficient Burners (UEB) for heating large residential buildings in New York City.

We, the NYC-located project's owner, are working on commercializing our breakthrough hydrogen-based ultra-efficient burner, which allows for reducing the specific gaseous and liquid hydrocarbon fuels consumption and carbon dioxide emission by around 60%. UEB has virtually non-existent CO and low NOx emissions.

In the UEB, natural gas or other hydrocarbon fuel is first reformed to hydrogen via high-temperature non-catalytic reforming in UEB's reforming chamber. Then, the hydrogen and other complimentary combustible gases are oxidized in the combustion chamber of the UEB by air oxygen, and the induced non-chemical reactions between dissociated hydrogen atoms and specific structural elements of the burner generate additional heat.

To our best knowledge, today, the UEB is the only available technology that reduces specific hydrocarbon fuel combustion by at least 60% and is ready for mass production. With the vast market volume and no competition, it was a no-brainer decision to start bringing the UEB to the industries and markets, starting from the most straightforward segment where modification of already installed equipment is not required, heating of large residential buildings.

The UEB is compatible with all conventional equipment used in thermal power production and energy-intensive industries (cement, metal, fertilizers, glass, hydrogen production, water desalination) and may be combined with gas turbines for stationary, aerial, marine, and highway transportation applications, with minor modifications. From the fourth year, the project will be able to exercise the opportunity to license the UEB to companies in the industries mentioned above. Although this option is not reflected in this business plan, it is clear that the licensing will increase the project's estimated fair market value manifold.

New York City was chosen for launching the project because of the Climate Mobilization Act that became law in 2019 in NYC. Under the Act[1], by 2030 and 2050, the emissions from NYC buildings over 25,000 square feet are requested to be reduced by 40% and 80% to the 2005 level. The Act sets an even more ambitious target for city-owned buildings: 40% by 2025 and 50% by 2030. Hefty fines are declared to be imposed on building owners for any emissions exceeding the limits. Typical compliance measures for large residential and office buildings are estimated to be several million dollars. Motivation to avoid such a costly alternative compliance-associated CAPEX may be as significant as motivation to reduce heating/cooling fuel-associated costs.

[1] https://www.urbangreencouncil.org/wp-content/uploads/2023/02/LL97-Summary_2.8.2023.pdf

The project hinges on a snowball strategy, a thermal energy supply contract, and profit-sharing. The snowball strategy means that due to the rapid, one-year recoupment of investments into the installed UEBs, the project can generate sufficient funds for sustainable growth without requiring additional external capital investments. The thermal energy supply service model offers the highest level of protection for the UEB know-how because the equipment remains the project owner's property, i.e., production, installation, maintenance, and repair of UEBs are solely provided by the owner. The profit-sharing means that the fuel savings will be split between customers and the owner in a 50/50 ratio, thereby eliminating risks for potential customers and allowing them to enjoy economic benefits from using a UEB starting from the second year (during the first year, the owner will be receiving all fuel savings). The absence of upfront costs will incentivize potential customers to opt for the service.

The project may be funded by capital investment, has a very high return on capital investment (ROI), and is resilient to variations of cash in- and our-flow. The project's major financial parameters are summarized in the table below. These parameters were estimated assuming that the only source of funds is capital received in the two first phases. Also, the assumption was made that the growth is funded solely from internal reserves, i.e., without credit funds.

Analysis shows that if credit funds are used starting from the fourth year, the growth can be increased several times without risking the project's solvency. The future cash flow ensured by the long-term customers' commitment will become solid collateral for the credit funds. The business plan did not consider such an option to avoid speculations concerning which weighted average cost of capital (WACC) the potential investors would be willing to tolerate. It is essential to highlight that although large office buildings in NYC can also be a part of this project, such an option was not considered in this business plan for simplicity.

Summary of the project's major parameters

Parameter	Phases One and Two	Phase Two
Duration (years)	1	6
Capital Investment ($m)	1	1
Total Number of Installations by the 8th Year	1	750
Cost per One Installation ($m)	0.1	
Annual Income/Sales per One Installation ($m)[2]	0.13	
Sales in the 7th Year ($m)	195	
Net Profit in the 7th Year ($m)	72.75	
P/E ratio	20	
Fair Market Value by the end of 7th Year ($m)	1,140	
Total Capital investment ($m)	2	

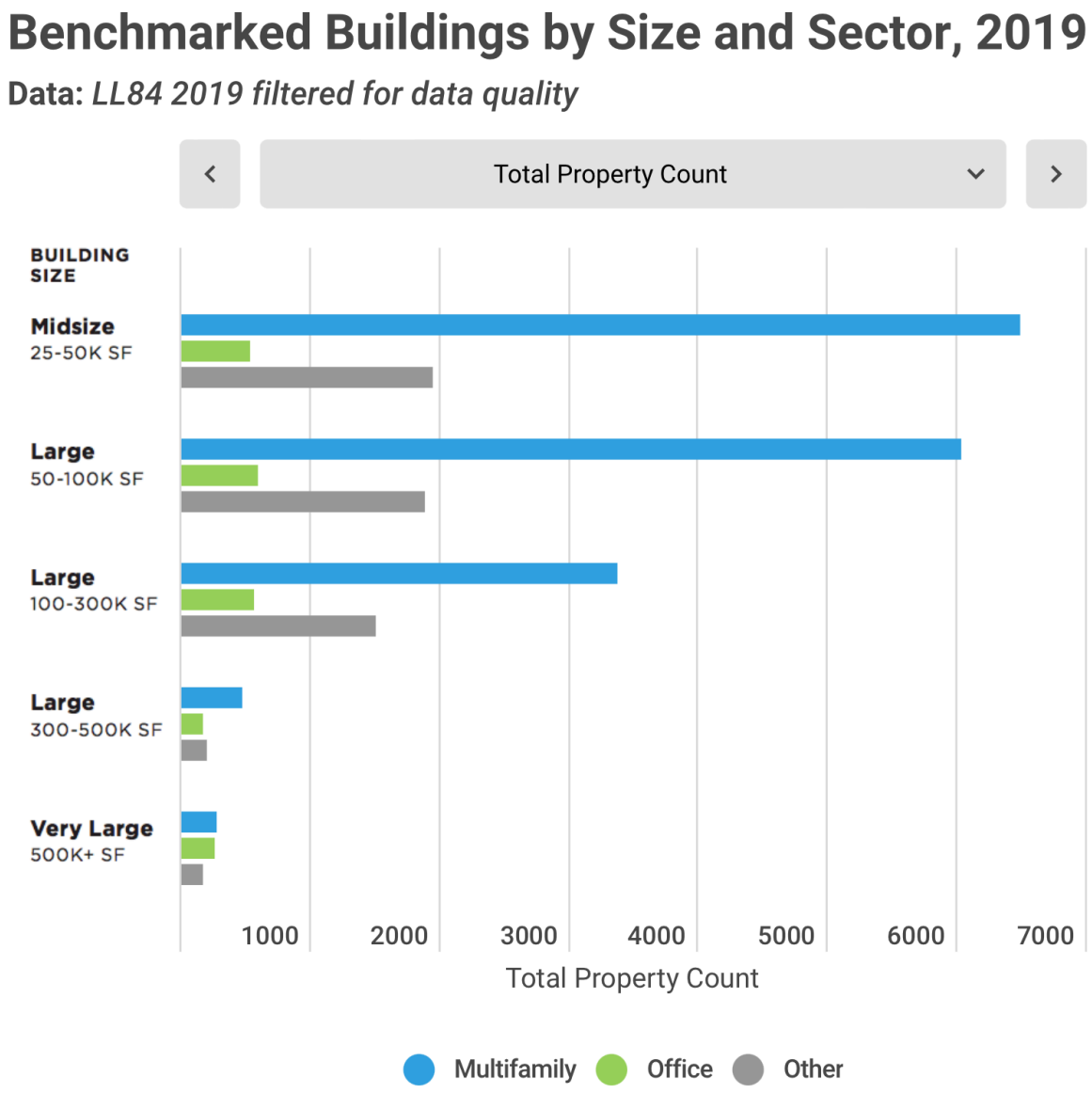
[2] Starting from the second year of the particular installation; in the first year the annual income per one installation is twice as that.

THE PROJECT OWNERS' PROFILE

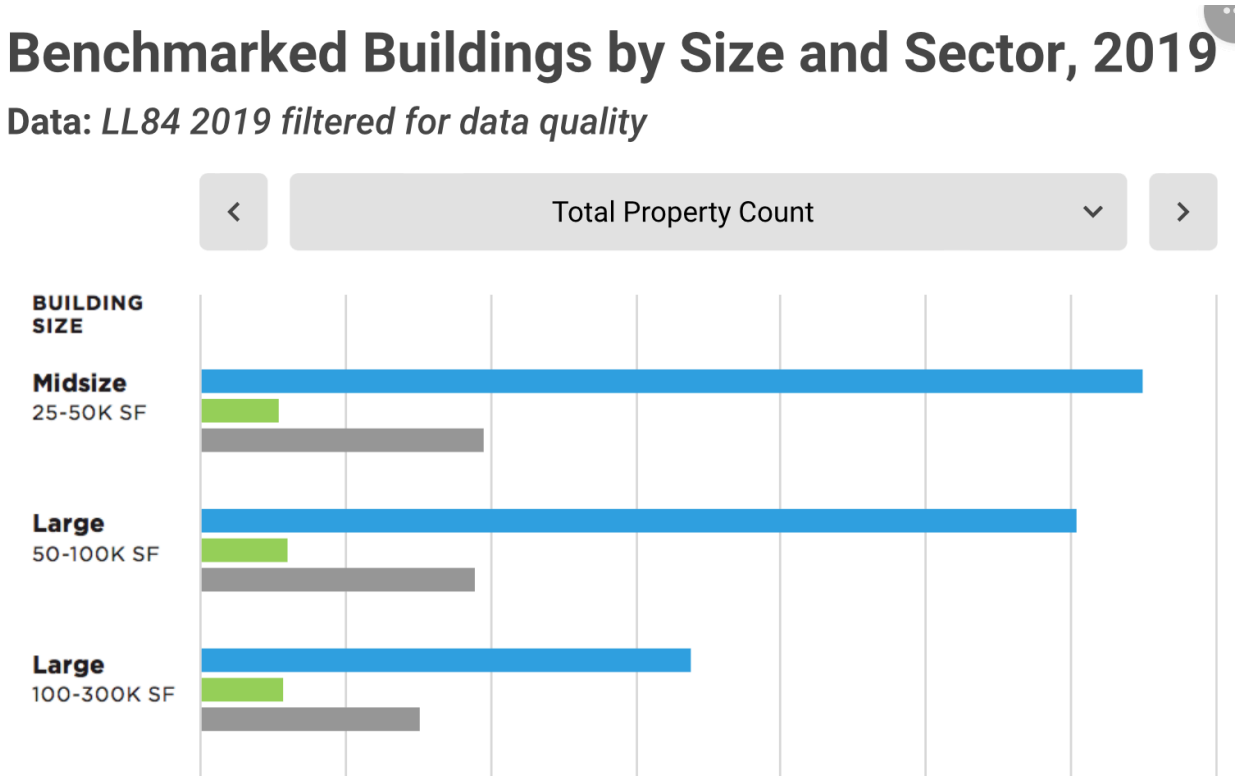
Paul Zabelin, a naturalized US citizen, is the project's founder. He's been a NYC resident since 2011. Paul holds a Master's Degree in physics, a Ph.D. in economics with a concentration on business strategy, and an MBA from the Business School of the Open British University, and was registered before the USPTO in 2013. From 1997 to 2007, Paul was the CEO of an engineering and property management company with 200 employees. From 2007 to 2018, he pioneered commercializing of an after-market fuel-saving technology for internal combustion engines. From 2018 – 2020, Paul worked as a patent agent at Haug Partners, LLP law firm. Since 2020, Paul has been the Managing Member of NYC-based AG Therm, LLC, the engineering company engaged in the development of advanced combustion technologies for energy-intensive industries.

THE MARKET AND THE PRODUCT

According to the Urban Green Council, in 2019, there were 16,630 residential buildings in NYC with more than 25,000 SF floor area each. Their total floor area was 1,183m SF. An entire floor area of 750 of the aforementioned residential buildings, each having a floor area exceeding 300,000 SF, was 443m SF. In other words, 4.5% of the largest residential buildings accounted for 27% of the overall floor of the 16,630 residential buildings. See the images below[3].



[3] https://www.urbangreencouncil.org/new-york-citys-2020-energy-and-water-use-report/

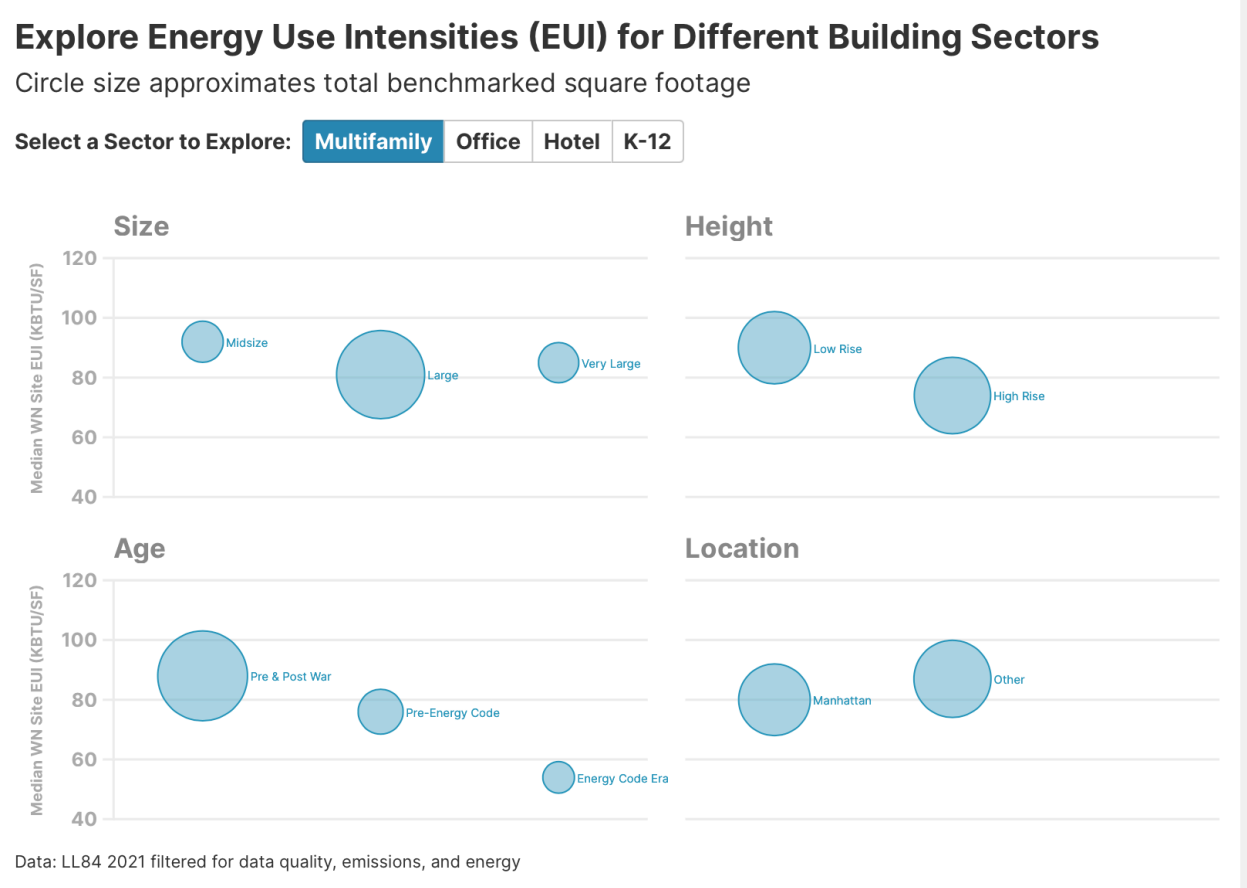


From the economic perspective, it is preferable to start installing UEBs in the largest buildings first because the cost of a UEB production, installation, and monitoring does not depend that much on its power. In contrast, the income generated by a UEB is almost directly proportional to its power, which in turn depends on the building's total floor area. For that reason, the 750 residential buildings with a total floor area of 443m. SF was set as the project's primary target.

Data provided by the Urban Green Council for the average energy usage intensity (EUI)[4] of different building sectors of NYC (see image below[5]) allows us to conservatively assume that the average EUI for each of these 750 residential buildings is 80,000 Btu/SF. Space and water heating accounts for at least 60% of this amount in NYC,[6] i.e., 48,000 Btu/SF. Conservative assumptions that 100% of these residential buildings are heated by natural gas (heating by fuel oil is substantially more expensive) and that the price of one thousand c.f. of natural gas is $16[7] brings to the conclusion that the average annual cost of natural gas for heating the one of these

[4] https://www.energystar.gov/buildings/benchmark/understand_metrics/what_eui#:~:text=It%27s%20calculated%20by%20dividing%20the,square%20feet%20or%20square%20meters
[5] https://www.urbangreencouncil.org/what-we-do/exploring-nyc-building-data/
[6] https://nap.nationalacademies.org/read/12621/chapter/4#59 , https://qsel.columbia.edu/nycenergy/about.html
[7] https://www.eia.gov/dnav/ng/hist/n3010ny3m.htm

750 residential building is $437,870[8]. Accordingly, the average annual sales per building is estimated at 30% of this amount, i.e., at around $130,000[9].



Although specific heating power (per one SF), for the most part, depends on the building's construction year and may significantly vary between large residential buildings in NYC, it is safe to assume that it typically does not exceed 35 BTU per SF (for offices it is considerably lower). Accordingly, the least spacious building among the target residential buildings with a floor area of around 300,000 SF will require a 3 MW UEB[10]. The UEB product line will be represented with several 3 – 9 MW UEBs models.

Each UEB will be equipped with a remote monitoring system to transfer data indicating the UEB's operation to the central operator's room. The monitoring system is needed to ensure UEB's structural intactness, proactively detect and fix potential technical issues, and measure the fuel expenditure to bill the customer automatically.

[8] (48,000*443,000,000*16)/(1,036,000*750)=437,870
[9] 437,870*0.3=130,000
[10] (300,000*35/3,412)=3 MW, were 3,412 is a BTU to kWh conversion factor

MANUFACTURING AND INSTALLING OF UEBs

The project is comprised of the three phases.

Phase	Description	Funding
The First (Preparatory) 8 months	Developing a 4 - 6 MW fully automated natural gas UEB compliant with NYC's regulations. Negotiating installation of the UEB with the first potential customer, a residential building in NYC.	0.5m
The Second (Entry) 4 months	Installing a first UEB in a first residential building. Monitoring the performance of the installed UEB for early detection of potential design, manufacturing flaws, and structural integrity. Preparing a set of legal documents for sustainable communication with customers and suppliers. Negotiating technical and business aspects of cooperation with supplies of constituent components for UEBs mass production. Launching a marketing campaign targeting groups of selected potential customers in NYC and accepting the pre-orders. Drawing internal manufacturing quality control rules, protocols and procedures, and mechanisms for enforcing them.	0.5m
The Third (Growth) 6 years	Manufacturing and installing UEBs in 750 residential buildings in NYC. Developing an online performance and structural integrity monitoring system for a UEB. Performing a full-fledged marketing campaign targeting all potential licensees. If necessary, modernizing and/or substituting earlier installed units with the latest models, free of design flaws and manufacturing defects (if such are present). Launching R&D for creating a non-destructive quality control system for UEBs, constituent components from suppliers, and developing UEBs with higher COP.	$1m

The production approach adopted for the implementation of the project is “flexible distributed manufacturing.” The manufacturing is “distributed” because the production of the majority of constituent components of UEBs will be outsourced. Only the most critical parts will be manufactured in-house. Being “distributed” also means that, if necessary, the UEB manufacturing may be launched virtually at any geographic territory in a short time. The manufacturing method's "flexibility" manifests in its ability to provide steady specific variable costs ($/per unit) when production/installation volumes vary. The requirement to be flexible was set at the project's outset to make it resilient to variations in the number of annual installations.

The advantages of such an approach are multiple, including low capital investments, high-quality components produced by reputable suppliers, the possibility to quickly scale up the production, etc. The scheduled transition to a licensing phase, starting from the fourth year, requires ensuring no unresolved technical flaws remain.

Preliminary estimates show that the hardware/equipment-related variable production costs per one UEB will be $100,000 in the second to fourth years and $90,000 in the following years. As was shown in the previous chapter, the estimated average sales per one installed UEB is $260,000 during the first year after the installation and $130,000 during the following years. In other words, during the first year after an installation, the project owner will receive 100% of fuel cost savings. The fuel cost savings will be split 50/50 between the project owner and the customer starting from the second year.

Conservative assumptions that the integral (federal, NY state, NYC) corporate income tax rate of the project won’t exceed 37% and that these hardware/equipment-related variable production costs are not deductible (in reality these costs will be deduced in the following years) lead to the conclusion that the growth may be approximated using the snowball (growth) matrix. The snowball matrix, a handy instrument for modeling the growth of a project having a short, of around a year, payback period of capital investments wherein the profit of each period is reinvested into the project to fuel the growth.

The snowball growth matrix for a one-year recoup/reinvestment cycle presented below allows us to quickly calculate the projected number of annual and total installations in years 2 to 7 if the number of installations during the first year is known or the number of total installations by the end of the 7th year is known. This can be done by multiplying the number of installations during the first year by “installation multiplier” or “installations multiplier, total” Since the target number of installations is 750, then, according to the snowball growth matrix, to achieve this target by the end of the 7th year, [750/144], i.e., five installations need to be done in the second year.

The snowball matrix makes it much easier to create the project's cash flow because it shows the labor force needed during each cycle and facilitates the calculation of the payroll expenses during each cycle (a year). The significant advantage of the snowball matrix is that it is an efficient tool for different optimizations under specific input parameters/limitations. Notably, it allows us to determine the fastest possible growth for a given amount of capital investments and a period of time. Moreover, if some parameters deviate from the plan during project implementation, the matrix helps to find the way to minimize the delay or losses and develop the most sustainable solution.

Snowball growth matrix for one-year reinvestment cycle.

Year Batch	2	3	4	5	6	7	8
1	2	1	1	1	1	1	1
2		4	2	2	2	2	2
3			10	5	5	5	5
4				26	13	13	13
5					68	34	34
6						178	89
7							466
Installations Multiplier,	1	2	5	13	34	89	233
Installations Multiplier, Cumulative	1	3	8	21	55	144	377

The table below shows how many personnel will be needed during each phase/year of the project to carry out the annual target number of installations and ensure sustainable growth

Table for estimating the payroll expenses.

Phase	**First**	**Second**	**Third**					
Year	**0.5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
New Installations		1 test	5	10	25	65	180	465
Total Installations			5	15	40	105	285	750
CEO	1	1	1	1	1	1	1	1
CFO					1	1	1	1
Marketing and BD					2	2	2	4
Procurement					1	2	2	3
Accounting					1	2	2	2
Human Resources					1	1	2	2
IT					1	2	2	2
Transportation					1	2	4	8
Legal					1	1	1	1
Electrical	1	1	1	1	2	4	4	4
Software					1	2	2	2
Mechanical	1	1	1	1	2	4	4	4
Quality Control					1	2	3	6
HVAC Technicians	1	1	1	2	4	6	16	40
Total Employees	4	4	4	5	20	32	46	80

The job positions are self-explanatory. HVAC technicians will perform UEBs installations during the warmer time of the season, assemble UEBs from the constituent parts, and test them during the colder time of the season. The projected number of HVAC technicians was estimated with the learning curve in mind. Their actual numbers may differ, but since the payroll costs are not expected to exceed 10 – 12% of the sales in Phase Three, even a 20% difference won't be critical.

During the first three years, the project will have a matrix organizational structure due to virtually merging R&D, production, installation, and monitoring operations into a single streamlined cycle with multiple feedback loops. For example, mechanical, electrical, and software engineers will create and test the fully automated 4 - 6 MW UEB during the First Phase. They will install this UEB on the first customer's site during the Second Phase. From the beginning of Phase Three, they will organize and start to manage UEB production, train HVAC technicians, and carry out R&D to improve UEB's performance and durability further. Later, the project's organizational structure may vary to adjust to the exponentially growing number of installations.

This business plan was prepared with a multi-layer risk mitigation approach in mind. Notably, there is an option to install 15 UEBs instead of 5 UEBs in the second year. This hypothetical option might look appealing at first glance because it would allow to reduce the project duration by one year and would only require an additional $1m in capital investment. This option, though, was rejected for being too risky because a 6-month successful operation of the first installed UEB during Phase Two is not a bulletproof guarantee that the original UEB design is free of technical issues. If such reveal themselves in 5 installed UEBs during the project's second year, it would be much easier and cheaper to fix them in 5 UEBs rather than in 15 UEBs. In the worst-case scenario, if these issues require the substitution of the installed UEBs with a modified version, dealing with 5 UEBs will be far less problematic than with 15 UEBs.

The online performance and structural integrity monitoring system is crucial for reducing UEB failure and safeguarding the know-how. This system will collect data on UEB's components' performance and UEB structural intactness and transfer them online to the operator's room for operator-assisted monitoring and analysis. The three primary reasons for having such a system are to know if someone interferes with a UEB, to track and record the technical parameters of a UEB, to create an algorithm for proactive detection of possible failures, and to automatically bill customers by measuring the fuel consumption in real time.

PROJECT'S ECONOMIC EFFICIENCY

Estimated sales.

As was outlined in the previous chapters, on average, one installed UEB will generate $260,000 in sales during the first year from the installation and $130,000 during the following years.

Estimated costs.

The most significant annual variable costs, i.e., costs directly proportional to the number of installations during a year, are costs of components needed for UEBs production. Estimates show that such a specific cost is around $100,000. Starting from the fifth year, they are expected to decrease to around $90,000 due to a rise in production volume.

The most considerable semi-fixed costs are payroll expenses. They exceed variable costs during the first four years. The average annual payroll expenses, including taxes and medical insurance per person, are estimated at $150,000. Other costs, including rent, legal, accounting, testing, IP, etc., are reflected in the cash-flow table below.

For simplicity, the project's cash flow was created based on the assumption that the cost of components is not deductible for the federal, state, and NYC corporate taxes purposes. This non-deductibility assumption understates the project's long-term profit by as much as [(100,000*0.37*750], i.e., $27.78m.

The project will be able to implement the Alternative Depreciation System (ADS) for expedited amortization of the cost of components over seven years[11]. Moreover, during the first three years, the project will avail the same year deduction of up to $1,160,000 under Section 179[12] during years two and three if this provision lives into the following years. Bonus depreciation[13] may also be used in case Section 179 is not extended.

Estimated investments.

The project's cash flow below shows that a $1m capital investment is needed to fund the first-year operations, and $1m is required to support the second-year operations. The second-year operations may be financed by a combination of capital and debt in a 50/50 ratio.

---

[11] https://www.irs.gov/publications/p946#en_US_2022_publink1000270861

[12] https://www.section179.org

[13] https://www.investopedia.com/terms/b/bonusdepreciation.asp#:~:text=Bonus%20depreciation%20is%20an%20accelerated,an%20eligible%20asset%27s%20cost%20upfront.

Project's cash flow.

The project's cash flow is based on a short-term, one-year cycled reinvestment of sales into the production and installation of UEBs. Cash flow for such a "snowball" business model is commonly calculated based on the minimum acceptable net present value (NPV) that depends on the capital investment available. To put it differently, the absolute value of NPV cannot exceed the funds a project has access to fund its operations. Multiple cash flows may be generated under a snowball business model depending on the priorities. Usually, these could be the maximum project's future fair market value (FMV), the shortest payback period, and the minimum capital investment. Typically, it is a reasonable combination of all of the priorities.

Project's cash flow.

	A	B	C	D	E	F	G	H	I
1			"NYC Residential Heating" Project Cash Flow						
2									
3	**Year**	1	2	3	4	5	6	7	8
4									
5	**Annual Installations**		5	10	25	65	180	465	0
6	**Total Installations**		5	15	40	105	285	750	750
7	**Payroll Expenses ($m)**	$ 0.60	$ 0.60	$ 0.75	$ 3.00	$ 4.80	$ 6.90	$ 12.00	$ 6.00
8	**Rent ($m)**	$ 0.10	$ 0.10	$ 0.10	$ 0.10	$ 0.50	$ 0.50	$ 0.50	$ 0.50
9	**Component Costs per Installation ($m)**		$ 0.10	$ 0.10	$ 0.10	$ 0.10	$ 0.09	$ 0.09	
10	**Total Componets Costs ($m)**	$ 0.20	$ 0.50	$ 1.00	$ 2.50	$ 6.50	$ 16.20	$ 41.85	
11	**Legal, Accounting, Testing Services Costs ($m)**	$ 0.10	$ 0.10	$ 0.20	$ 0.20	$ 0.50	$ 0.50	$ 0.50	$ 0.50
12	**Annual Sales ($m)**		$ 1.30	$ 3.90	$ 10.40	$ 27.30	$ 74.10	$ 195.00	$ 97.50
13	**Present Value, PV ($m)**	$ (1.00)	$ (0.19)	$ 0.80	$ 1.97	$ 7.05	$ 25.51	$ 72.81	$ 57.02
14	**Net Present Value, NPV ($m)**	$ (1.00)	$ (1.19)	$ (0.39)	$ 1.58	$ 8.63	$ 34.13	$ 106.94	$ 163.96
15									
16	**Specific Annual Sales ($m)**	$ 0.13							
17	**Integral Coprporate Tax Rate**	0.37							
18	**Price to Earnigs Ration, P/E**	20							
19	**Fair Market Value , FMV ($m)**	$ 1,140.3							

The cash flow is presented in PV money value for the first year. The cash flow was created assuming no installations in the eighth year. This was done to calculate the net income without growth to estimate the project's fair market value by the end of the seventh year. In other respects, the cash flow is self-evident and does not require elaboration.

The cash flow Excel model shows that the project is resilient to variations of the constituent parameters, including the number of annual installations. Suppose unexpected circumstances cause a rise in costs or reduced scheduled yearly installations. In that case, there will always be an option to postpone installations to avoid the necessity of attracting additional capital investment.

The project's current value is estimated at $10m. If an investor places $2m into the project and obtains a 20% share for this investment, the investor is expected to receive a return on investment (ROI) of at least [1,140.8*0.2/2], i.e., 114 times (or 11,400%) in seven years. It is implied that the investor will only be asked to commit to fund the Second or Third Phase operations based on the achieved results of the previous phase.