

---

ITT – Institute for Technology and Resources Management in the Tropics and  
Subtropics

T3181 – Entrepreneurship

## Business plan:

### Stadternte

By

Khaled El-Hodaiby (Group Leader)

(11127817)

Trang Dinh

(11129064)

Ilkin Hasanli

(11129251)

Malte Küper

(11125678)

Ashton Walker

(11125682)

28.01.2019

## Executive summary

Stadterne is a greenhouse design and construction company aiming to convert unused rooftops to the agricultural areas or gardens. Our rooftop greenhouses not only bring agriculture back to the cities but improve the building's footprint by capturing waste heat and using it for local agriculture. The roof is the limit.

The urban farming is not new concept of food production and has increased in popularity in recent years. Considering the German rooftop greenhouse market, there are no complete projects, except several projects that are under development. Stadterne assessed the opportunities for rooftop greenhouses in Germany, finding some 300 potential customers in Germany.

Stadterne is targeting industrial and residential sectors as main customer groups. Stadterne believes there is a strong case for industrial customers to adopt the technology, particularly food producing customers, with the opportunity to capture waste heat and CO<sub>2</sub> from buildings to improve their efficiency. Additionally, there is strong residential interest in gardening in Germany, creating potentially another market for Stadterne's product.

The marketing strategy of Stadterne will be a mix of direct marketing and online presence / search engine optimization. Additionally, the company will follow social and environmental marketing concepts which emphasizes importance of the social responsibility that is prioritizing improvement of customer's and society's well-being.

Rooftop farming is a new way of agriculture in the cities and taking into consideration that several startups have failed Stadterne plans to start lean with initially low operational costs using sub-contracting construction companies in order to reduce risks. During this time the company will gain experience and establish itself in the market. Once the company is fully established and operational, the installation will be internalized by employing installers in the fifth year.

It is forecast that the company will have negative dividend during the first 3 years before yielding positive dividends. The net cash flow will remain negative until the year 6. The losses are generated because of the initial investment costs and will be covered from the 6<sup>th</sup> year of operation. To remain profitable Stadterne needs to complete 3 projects each year. The company requires an initial financing of €1,494,958, of which €494,958 will be self-financed and €1,000,000. By year 10 of operation the company forecasts a net cash flow of around €2,800,000. Because of the low volume of projects, the company runs a risk of losses if an inadequate number of projects are found.

This Business Plan shows that constructing rooftop greenhouses in Germany is feasible, albeit with some remaining risk that cannot be avoided.

# Table of Contents

1.	Introduction.....	1
1.1.	Our Product .....	1
1.2.	Why Stadternte? .....	1
1.3.	Stadternte - Mission, Vision and Values.....	1
1.4.	The Customer’s Benefits .....	2
2.	State of the Art .....	3
2.1.	Current State of Rooftop Greenhouses.....	3
2.2.	Rooftop Greenhouse Benefits.....	4
2.2.1.	Food Production Benefits.....	4
2.2.2.	Energy Benefits.....	4
2.2.3.	Environmental Benefits .....	4
2.2.4.	Economic Benefits .....	5
2.2.5.	Social Benefits .....	5
2.3.	Rooftop Greenhouse Requirements .....	5
2.3.1.	Structural.....	5
2.3.2.	Competition for Space.....	6
2.3.3.	Planning Approvals.....	6
3.	Case Study – TH Köln .....	7
4.	Market Analysis .....	8
4.1.	Customers and Intended Target Groups .....	8
4.1.1.	Industrial – Focus Food Industry .....	8
4.1.2.	Apartments – Rooftop “Schrebergarten” .....	8
4.2.	Market Size Analysis.....	8
4.3.	Market Competition.....	9
5.	Marketing Concept.....	10
5.1.	Marketing Channels .....	10
5.1.1.	Direct marketing.....	10
5.1.2.	Online presence / Search Engine Optimization.....	10
5.1.3.	Communication and Public Relations (PR) .....	11
5.2.	Marketing Strategy and Unique Selling Points (USP).....	11
5.2.1.	Target market .....	11
5.2.2.	Customer Needs .....	11

5.2.3.	Integrated Marketing .....	12
5.2.4.	Profitability .....	12
6.	Business Strategy.....	13
7.	Business Financial Plan.....	14
7.1.	Cost Calculations .....	14
7.1.1.	Investment Costs .....	14
7.1.2.	Depreciation Costs .....	15
7.1.3.	Consumption Costs.....	15
7.1.4.	Operational Costs .....	18
7.1.5.	Financing Costs.....	18
7.2.	Sales Price.....	19
7.3.	Business Cash flow .....	19
8.	Company Structure.....	22
8.1.	Legal form.....	22
8.2.	Legal Considerations .....	23
8.3.	Business Location .....	23
8.4.	Social insurance plan .....	24
9.	Conclusion .....	25
10.	References.....	26
11.	Annex.....	28
11.1.	Stadternekte - Articles of Association .....	28
11.2.	Working contract.....	30

## Table of Figures

Figure 1: Example roof-top Greenhouse .....	2
Figure 2: An example of a Rooftop Greenhouse .....	3
Figure 3: The global trend of Urban Rooftop Farming (incl. Greenhouses) .....	3
Figure 4: Example 2 roof-top Greenhouse .....	6
Figure 5: Overview of Stadterne's Market Entry Strategy .....	13
Figure 6: Example 3 Roof-top Greenhouse .....	13
Figure 8: Dividend forecast for its first 10 years. ....	21
Figure 9: The net cash flow of Stadterne for its first 10 years.....	21

## Table of Tables

Table 1: Food Production Yields of Rooftop Greenhouses around the world .....	4
Table 2: Cost calculation investment .....	14
Table 3: Depreciation costs .....	15
Table 4: Consumption Cost – 1000 m <sup>2</sup> Greenhouse .....	16
Table 5: Consumption Cost - Add on Modules.....	16
Table 6: Consumption Cost Breakdown 1000 m <sup>2</sup> Greenhouse .....	17
Table 7: Final Product costs summary.....	18
Table 8: Operational costs.....	18
Table 9: Financing costs.....	18
Table 10: Bank loan payback schedule.....	19
Table 11: Sales Price of Stadterne Greenhouses and Add-on Modules .....	19
Table 12: Business cash flow .....	20
Table 13: Legal Company forms in Germany .....	22
Table 14: Stadterne personnel insurance costs .....	24

## List of Abbreviations

BMBF .....	<i>Federal Ministry of Education and Research</i>
CHP .....	<i>Combined Heat and Power</i>
CO <sub>2</sub> .....	<i>Carbon dioxide</i>
GmbH.....	<i>Gesellschaft mit beschränkter Haftung</i>
HVAC.....	<i>Heating, Ventilation and Air-conditioning</i>
IHK .....	<i>Industrie und Handelskammer</i>
KfW .....	<i>German development bank</i>
KPIs .....	<i>Key Performance Indicators</i>
KTBL.....	<i>Kuratorium für Technik und Bauwesen in der Landwirtschaft</i>
m <sup>2</sup> .....	<i>Square-meter</i>
PR.....	<i>Public Relations</i>
PV.....	<i>Photovoltaic</i>
USGSA.....	<i>United States General Services Administration</i>

## 1. Introduction

Stadternte aims to bring food back into the city by offering technology to reclaim unused roof spaces and convert them into agriculture.

### 1.1. Our Product

Stadternte is a **Rooftop Greenhouse** design and installation company. Our greenhouses are custom configured for each building based on our 1000 m<sup>2</sup> standard design. Stadternte will work with local glass producers and metal fabricators to produce an on-site assemblable rooftop greenhouse.

The greenhouse is our base-product, in addition to the greenhouse we offer additional **modules** to better integrate the greenhouse into the building including:

- Rain Water Capture Module
- Waste-Heat Capture Module (for CHP, gas boiler or similar waste heat)
- CO<sub>2</sub> Injection Module (only for burnt natural gas exhaust)
- LED lighting Module
- Air Cycling Module (to bring plant filtered air into the building for occupant comfort)
- Climate and Monitoring Modules

### 1.2. Why Stadternte?

We offer the technology to reclaim unused space in cities for agriculture. Our rooftop greenhouses not only bring agriculture back to the cities but improve the building's footprint by capturing waste heat and using it for local agriculture. The roof is the limit.

Urban Rooftop Agriculture provides not only food but a host of other benefits including lower food kilometers, improved food security/resilience, closing the nutrient cycle, reduces the urban heat island, providing local jobs economic and connecting community with their food.

### 1.3. Stadternte - Mission, Vision and Values

Stadternte's mission, vision and values are what will drive the company to change to city skyline into something greener.

#### **Mission:**

Our mission is to enable the production of awesome real food within greener cities, plus:

- To promoting awareness for city inhabitants about their origin and value of the food
- To integrating green spaces in the concrete jungle
- To decentralize the urban food supply
- To reduce the urban foot-print

#### **Vision:**

To be an industry leader of rooftop greenhouses and urban agriculture in Europe and beyond creating a world where urban dwellers are connected to locally produced, real food. The roof is the limit.

#### **Values:**

Local production, local jobs and sustainable agriculture. Seeking strength from welcoming diverse experiences, cultures and points of view, and from respecting the integrity of the natural world.

#### 1.4. The Customer's Benefits

Congratulations, you are now the proud owner of a 1000 m<sup>2</sup> Stadterne Rooftop Greenhouse. What can you expect from your greenhouse?

- 12,000 kg to 24,000 kg of local organic vegetables annually from €2 to €5 per kg<sup>1</sup>
- Reduced heating/cooling costs
- Reduce water costs (with the water module)
- Higher building efficiency rating
- Cleaner air inside the building (with the air cycling module)
- Capture and use of waste heat/CO<sub>2</sub>
- Improved property value
- Serious green branding



Figure 1: Example roof-top Greenhouse<sup>2</sup>

---

<sup>1</sup> See Section 2.2 for expected yields, calculation based on a 20 year lifetime with purchase price as given in Section 7.2.

<sup>2</sup><https://www.igrow.news/news/new-affordable-bronx-development-will-feature-a-rooftop-aquaponics-greenhouse>

## 2. State of the Art

The concept of producing food within city boundaries is nothing new; historically cities produced most of their food. However, over the course of the 20th century this changed, and the production of food moved from cities to the countryside. In recent years there have been increasing calls to return food production to the city. Rooftop greenhouses present a possibility to do this. This section presents the current state of rooftop greenhouses focused on Germany.

### 2.1. Current State of Rooftop Greenhouses

Rooftop greenhouses are a relatively new concept, which moves the traditional greenhouse onto unused roof space. An example of a Rooftop Greenhouse is in Figure 2.



Figure 2: An example of a Rooftop Greenhouse<sup>3</sup>

To date there has been limited adoption of rooftop farming within cities, with only several commercial examples available worldwide. Instead much of the work to date has been research focusing on its potential and limitation, without focus on commercial viability<sup>4</sup>. In Europe rooftop farming is still in an early stage of development with only some starting projects.<sup>5</sup> Shown below in Figure 3 is a the development of rooftop farming worldwide, showing a sharp increase in recent years, but still noting that total farmed area is only around 10 hectares.

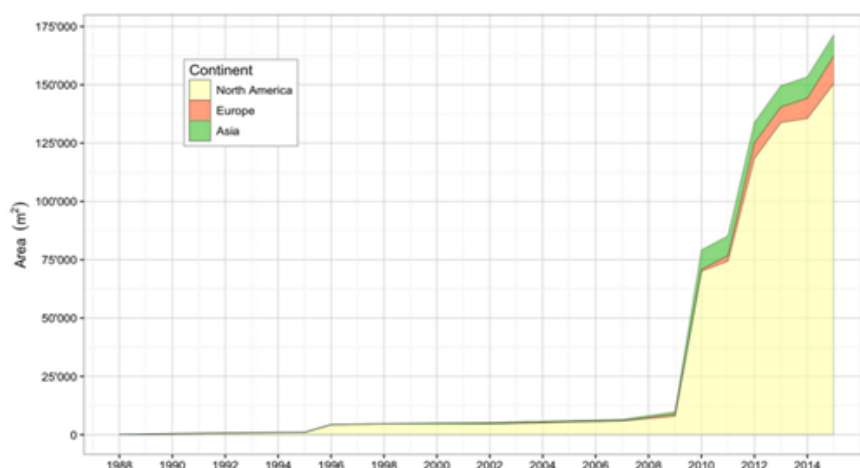


Figure 3: The global trend of Urban Rooftop Farming (incl. Greenhouses)<sup>6</sup>

<sup>3</sup> (Lufa Farms, 2019)

<sup>4</sup> (Buehler and Jung, 2016)

<sup>5</sup> (Pons, 2015)

<sup>6</sup> (Buehler and Jung, 2016)



Focusing on Germany, at the time of writing there were no completed Rooftop Greenhouses, however several projects were under development, most notably the Altmarkt-Oberhausen project, see Market Competition. The German Government has funded research and in-pipeline projects. Notably the “Urban Agriculture: Zero-Acreage Farming” project released a comprehensive guide to developing rooftop greenhouses.

In terms of technology, the technology is available. Rooftop greenhouses are simply an adaptation of a century old technology. Stadterne will spend year 0 finalizing standard designs, including the add-on modules, to finalize its product.

2.2. Rooftop Greenhouse Benefits

The addition of a greenhouse on a building’s roof brings a suite of potential benefits for the building owners and occupants. The obvious benefit of food production is only one elements of the positive impact this technology can bring, there are also energy, environmental and economic benefits. A brief summary of anticipated benefits is as follows:

2.2.1. Food Production Benefits

Rooftop greenhouses can produce in the range of 12 to 24 kg/m<sup>2</sup> of vegetables per year depending on a number of factors. A number of studies were assessed to identify possible yields for a Stadterne greenhouse, shown below in Table 1.

Table 1: Food Production Yields of Rooftop Greenhouses around the world

Study	Location	Crop	Annual Yield
(Francesco Orsini, 2014)	Bologna, Italy	Various incl. Tomatoes, Eggplant, Lettuce	15.2 kg/m <sup>2</sup> year
(David Sanjuan-Delmás, 2018)	Barcelona, Spain	Tomatoes	19.6 kg/m <sup>2</sup> year
(Liu, Yang, Han, & Ow, 2016)	Guangzhou, China	Various Leafy Greens	12.1 kg/m <sup>2</sup> year
(Lufa Farms, 2018)	Montreal, Canada	Diverse range of vegetables	24.3 kg/m <sup>2</sup> year

2.2.2. Energy Benefits

The addition of a greenhouse to a roof provides a range of potential energy savings for the building owner, including:

- Lower energy consumption due to the cooling effect of plant respiration and the insulation, shading and thermal mass of the plant and soil layers
- Capture and use of waste heat from buildings
- Capture and use of CO<sub>2</sub> from buildings for plant growth

2.2.3. Environmental Benefits<sup>7</sup>

Rooftop greenhouses create a number of local environmental benefits including:

- Improved biodiversity (insects and plants)

<sup>7</sup> (Grard, et al., 2018)

- Pollination
- Water run-off mitigation, lowering flood risk
- Improved local air quality
- Closing the nutrient cycle
- Reduction of the Urban Heat Island effect
- Reduced food transportation
- Reduced greenhouse gas production from building energy use

#### 2.2.4. Economic Benefits<sup>8</sup>

Besides environmental benefits rooftop greenhouses provide a range of economic benefits for the building owner and wider community, namely:

- Lower energy costs due reduced energy consumption
- A less frequent roof replacement schedule due to greater durability than conventional roofs
- Reduced storm water management costs due to increased water retention
- The creation of job opportunities for green employment and in the emerging field of urban agriculture
- Increase property values due to access to green spaces

#### 2.2.5. Social Benefits

Rooftop greenhouses are a part of greening cities which brings a range of benefits to the city dwellers estimated by to be up to €30 per square meter of social benefits (3.30 USD per square foot from a USGSA estimate). A list of these benefits follows:

- Psychological benefits (like health, wellbeing, children development)
- Reduction in antisocial behavior
- Air quality improvement
- Aesthetics and quality of life
- Provision of recreational space
- Increase Human comfort due to improved temperatures
- Reduced incidence of “food deserts” (city areas with poor access to fresh food)
- Increased food supply resilience

### 2.3. Rooftop Greenhouse Requirements

To implement rooftop greenhouses, there are a number of practical challenges to be overcome, namely:

#### 2.3.1. Structural

The addition of agriculture to a roof will add typically about 120–150 kg/m<sup>2</sup> of weight to a rooftop which presents a potential structural problem.<sup>9</sup>

---

<sup>8</sup> USGSA (United States General Services Administration), 2011; Brockdorff et al., 2017

<sup>9</sup> (H.F. Castleton, 2010)

### 2.3.2. Competition for Space

Rooftops have traditionally been used for housing Heating, Ventilation and Air-conditioning (HVAC) equipment, as well as various chimneys, exhausts, communications and other rooftop infrastructure. More recently roofs have been used as a platform for Solar Photovoltaic (PV) generators. Our product is in direct competition for roof space with this equipment.

### 2.3.3. Planning Approvals

The addition of a greenhouse to a roof is an unconventional building modification, there may be some difficulties obtaining building permission.

As part of the design and planning process of each project, Stadterneite will assess and manage these challenges to realize the project.

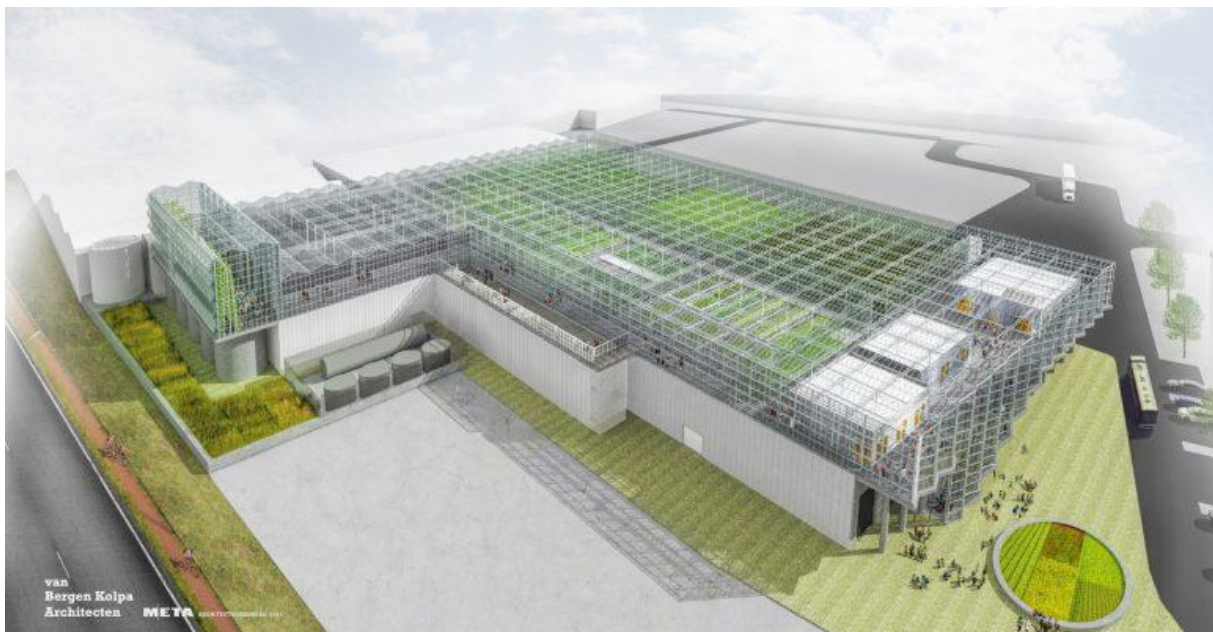


Figure 4: Example 2 roof-top Greenhouse<sup>10</sup>

<sup>10</sup> <https://vertical-farming.net/blog/2018/09/12/avf-member-inagro-rooftop-greenhouse/>

### 3. Case Study – TH Köln

To provide a concrete example of a Stadternte rooftop greenhouse, a system for the TH Köln Deutz campus is presented below. The roof of the Mensa of the Deutz campus measures roughly 1000m<sup>2</sup>, an ideal candidate for our standard system, with some customisation needed to fit it to the roof, see Figure 5.

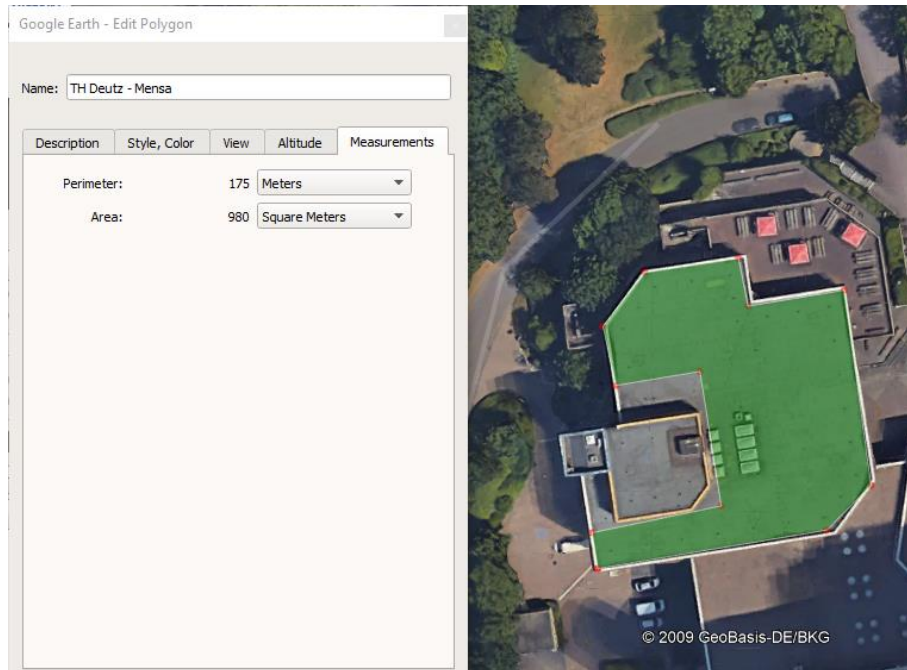


Figure 5: Rooftop measurements of the Mensa at the TH Köln Deutz Campus

This greenhouse, when farmed intensively, could yield up to 12,000–24,000 kg of local organic vegetables annually from €2–€5 per kg<sup>11</sup>. This yield equates to roughly 200–400 kg per week, enough to provide 100g of fresh produce to some 2000–4000 meals for staff and students for €0.2–€0.5 additional costs. This is in addition to the building energy benefits presented in Section 2. Furthermore, this provides a test bed for research for the *Institut für Bau- und Landmaschinentechnik* of the TH Köln .

<sup>11</sup> See Section 2.2 for expected yields, calculation based on a 20 year lifetime with purchase price as given in Section 7.2.

## 4. Market Analysis

Green roofs are now considered as a mainstream technology with the aim of helping cities to adapt to climate change. Stadterne's rooftop greenhouses are a variant on this, with enhanced capabilities to improve the building's efficiency. A market analysis was performed in order to know the potential customers and how the urban agriculture trends are expected to develop. Stadterne aims to focus on the German market but remains open to Europe wide projects.

### 4.1. Customers and Intended Target Groups

The primary targeted groups are the industrial sector and the residential sectors. Those are considered for two reasons, the first is that they play major roles in urban landscape design and use, the second is that they cover a significant area of the urban landscape and the space for food production is limited, which generates an urgent need to combine spaces:

#### 4.1.1. Industrial – Focus Food Industry

The industrial sector is considered one of the most intensive energy users globally (36% of global final total energy). The waste of energy, bio-material and water can be used to grow a great amount of food that will reduce the GHG emissions and improve the efficiency of the buildings.<sup>12</sup>

The industrial sector is a key market for Stadterne as they have typically roof areas, produce waste heat (which can be used to heat the greenhouse), and are likely to be able to fund the investments required to realize a rooftop greenhouse. Of particular interest to Stadterne would be the food production industry due to the complementary nature of onsite food production and processing. On industrial sites it is also foreseen that CO<sub>2</sub> emissions like can be captured to enhance growing conditions for the plants and soil.

#### 4.1.2. Apartments – Rooftop "Schrebergarten"

There is substantial community interest in gardening in Germany as attested to by the number of "Schrebergarten". Those small scale, urban gardens are used both for recreation and own-requirements farming and highlight the on-going tradition of urban farming in Germany.<sup>13</sup> For example, the federal state of Nord Rhine-Westphalia has over 11 million m<sup>2</sup> of those small urban gardens. Cologne alone over 6 million m<sup>2</sup> or 1.6% of the area of the city.<sup>14</sup> Stadterne could service this demand by offering a unique way of food production / gardening in urban spaces.

### 4.2. Market Size Analysis

According to the European Federation of Green Roof and Wall Associations, the German market of green roofs expanded from 86 million square meters in 2014 to 150 million square meters in 2017, with about eight million square meters a year. Additionally, some cities in Germany ruled that all new buildings and restoration work in its city center must have green roofs, an example being Essen. Other cities like Hamburg have implemented tax incentives for green roofs.<sup>15</sup> Stadterne aims to capture some of this market for rooftop greenhouses.

---

<sup>12</sup> (IEA, 2018)

<sup>13</sup> (Die Welt, 2011)

<sup>14</sup> <https://www.umwelt.nrw.de/fileadmin/redaktion/PDFs/landwirtschaft/Kleingartenstudie.pdf> ) Table 6

<sup>15</sup> (Chinadialogue, 2017)

Stadternte developed an estimate of the number of rooftop greenhouse opportunities in Germany by extrapolating the findings of a GIS analysis on the number of green roof opportunities in a German city. *A GIS-based mapping methodology of urban green roof ecosystem services applied to a Central European city*<sup>16</sup> found that for the city of Braunschweig, Germany there were some 867 high benefit green roof opportunities. This number was then extrapolated to the whole of Germany<sup>17</sup>, finding there are roughly 300,000 appropriate roofs for Rooftop Greenhouses in Germany. However, very few will be appropriate for various reasons and have owners ready to invest, so a conservative estimate was developed of some 300 roofs<sup>18</sup> are available and ready to invest in a Stadternte Rooftop Greenhouse in Germany. The challenge for Stadternte is successfully contacting and selling the product to this small number of roofs.

### 4.3. Market Competition

The market research in the area of rooftop greenhouses shows that this way of farming is not popular in Germany. The scope of rooftop gardening has not been passed beyond to some research and prototype projects.

- [DACHFARM Berlin](#) is a company that cooperates with innovative Berlin companies and research institutions from the fields of architecture, agriculture and energy and water management in order to exploit the potential of unused building and roof areas for the professional cultivation of crops and for participatory community gardens. The Dachfarm has several concept rooftop greenhouse projects in Berlin, however the company is still in a startup period.
- [ROOF WATER-FARM](#) is the research project working on innovative water management and urban food supply. The project is funded by the Federal Ministry of Education and Research (BMBF) under the funding measure "Intelligent and Multifunctional Infrastructure Systems for Sustainable Water Supply and Sanitation".
- [Altmarktgarten](#) is the rooftop greenhouse project that will be implemented on the roof of former market hall in Oberhausen. The project is publicly funded as the "National Urban Development Project". It is planned that the roof greenhouse is integrated into the material cycles and thus the material cycles (water, energy) are optimized. The project is under construction.
- Further projects: [Frisch vom Dach](#), [Urbanfarmer AG](#), [ICTA Rooftop Greenhouse Lab](#) (Prototype in Spain)

---

<sup>16</sup> (Grunwald, L et al, 2017)

<sup>17</sup> Braunschweig's population (242,537) is 0.29% of Germany's population (82,790,700). Extrapolating the 867 roofs by dividing by 0.29% gives ~300,000.

<sup>18</sup> Assumes 10% of the 300,000 roofs are appropriate for a rooftop greenhouse and of these 1% are ready to invest in a Rooftop Greenhouse.

## 5. Marketing Concept

This section briefly details the plan Stadternte will use to go to market and make potential customers aware of our product and its benefits.

### 5.1. Marketing Channels

Stadternte's marketing will be directed into two key channels, direct marketing to the customer

#### 5.1.1. Direct marketing

Stadternte will use several direct marketing approaches to access an initial market. Direct marketing is a form of advertising that allows the company communicate directly with customers through a variety of media or marketing channels such as cold calls or cold emails and targeted online ads. Since it's an aggressive form of marketing, it can potentially grow a customer base quickly for a start-up company. The overarching goal of our direct marketing campaign is a call for customers to take response by offering them an incentive or enticing message. Another strategy will be to exhibit at appropriate conferences (e.g. conferences for the food production / processing industry or a sustainable community conference). The results of the campaign are tangible, measurable action such as purchases, sign-ups, or enquiries for further information. There are so many alternatives that can be easily applied and switched among each other in direct marketing.

Nevertheless, it can be costly and challenging, but the efforts pay quickly with the modern approaches to reach the potential customers.

#### 5.1.2. Online presence / Search Engine Optimization

Stadternte aims to use an online presence and Search Engine Optimization (SEO) to allow potential customers to find us. A great way to reach potential customers is made use of Google's search engine, Google My Business and/ or Google Places (with a description of our business profile, pictures of our products, opening hours, contact information and our website link). Another advertising venue that has seen much success for local businesses is sponsored search results – Google AdWords. By bidding on our oriented key words or phrases, we can target only customers in our area of interests, and have our website displayed at the top of Google's sponsored results.

Another digital representation of our business is our company's website. Our site will be designed by a professional designer, containing all necessary & easily accessible contents to attract potential customers. Creating entertaining and engaging articles will be also regularly published to advertise our products and build up loyal followers.

Even though the advertisement market has been shifting heavily from traditional (offline) to online campaigns, direct mail can still be an effective & creative way to reach local audiences. For example, a promotion coupon, flyers/posters can add perceived value in the customer's mind. Another interesting way is sending direct mails for an official invitation to an event holding at our business. "Whether it's a product information seminar or community event, receiving an invitation in the mail still has a certain charm to it over other means of communication"<sup>19</sup>.

---

<sup>19</sup> Marketing "Must-Haves" for Your Retail Greenhouse, Garden Center & Nursery, GGS Greenhouse, <https://ggs-greenhouse.com/blog/greenhouse-garden-center-nursery-marketing>



Social media, like Facebook, Twitter and Instagram should also be considered for marketing purposes. A detailed social-media marketing campaign must be designed in line with business locations and intended target groups. Additionally, to the benefits of increasing market shares and extending the customer base digital marketing provides free user statistics and access data which can be used to model customer behavior and estimate accessible market volume.

#### 5.1.3. Communication and Public Relations (PR)

As the market of interest is rather regional, good communication and public relations are essential to bind customers long-term and enable closed feedback-loops on produce quality and demand development. Communication and feedback from customers during produce drop-off is crucial and can be used to optimize production towards the regional needs.

Customer relations can be fostered in events or via direct contact during orders & sales, public authorities and local competitors should be considered within the communication structures. Close work with authorities is necessary for various approvals and fulfilling legal obligations.

### 5.2. Marketing Strategy and Unique Selling Points (USP)

This section summarizes the marketing strategy and the unique selling points (USP) of Stadterne's product. In short, the message Stadterne wants to send out to potential and existing customers. The four key pillars of our marketing strategy include:

#### 5.2.1. Target market

The marketing concept will direct Stadterne's marketing resources towards its two target customer groups: Industrial Customers and Apartments. The greenhouses are designed that they are owned by the future customers in order to grow their own crops or greenhouse gardens. The tone of communication wants to be conveyed as follows:

- *Meeting needs profitably*
- *Find wants and fill them*
- *Love the customer, not the product*
- *Have it your way*
- *You're the boss*
- *Putting people first*
- *Partners for profit<sup>20</sup>*

#### 5.2.2. Customer Needs

In order to understand customer needs and wants, three marketing approaches will be explored: (i) responsive marketing to find and (then) meet current customer needs; (ii) an anticipative marketing to look ahead into potential customer needs in the near future and; (iii) a creative marketing to discover and produce solutions that customers did not ask for but to which they enthusiastically respond. The marketing concept will focus on satisfying target customers (customer retention) than attracting new customers (customer attraction) as reaching & obtaining a new customer can cost around 5 to 16 times as much as retaining or pleasing an existing one<sup>21</sup>.

---

<sup>20</sup> Marketing Concept, GP Global Ltd, <http://www.gpglobalcy.com/default.aspx?articleid=1190>



### 5.2.3. Integrated Marketing

An integrated marketing strategy will be prepared and implemented during the business planning and registration phase. It consists of both internal and external marketing, in which internal marketing must precede external marketing. Providing that “Marketing is far too important to be left only to the marketing department”, all Stadternte’s staffs are required to work together to serve the customer’s interests. An internal marketing program which includes the task of hiring, training, and motivating employees who able to serve and satisfy customers well is an initial step in our integrated marketing strategy. A description will be also prepared for every job position with an explanation of how that job can affect the customer and influence company’s targets. An excellent customer service only can achieve when the company’s staff is ready to provide it.

### 5.2.4. Profitability

The company profits are achieved mainly as a result of creating superior customer value. In addition, as a company promoting green and sustainable solutions & technologies, our marketing concept is also towards a sustainable, socially and environmentally responsible marketing which is called as a societal marketing concept. It emphasizes on social responsibilities to sustain long-term success as the company provides value to the customers to maintain and improve both the customers and society’s well-being better than the competitors. It means that the marketing strategy should be designed to meet the present needs of consumers and businesses while also preserving or enhancing the ability of future generations to meet their needs. This new concept is expected to create more added values for the company as following:<sup>21</sup>

- Build a better image for the company
- Gives a competitive advantage over the competitors
- Maximize profits for the organization and creates a long-term relationship with customers
- Encourages developing products that benefit society in a long run and satisfy consumers
- Increases the sales and market share
- Facilitate expansion and growth in the long term
- Products and company policy will prioritize the social welfare and society in general

---

<sup>21</sup> *Societal Marketing Concept Examples, Advantages and Importance, iEduNote, <https://iedunote.com/societal-marketing-concept>*

## 6. Business Strategy

Stadternte is bringing a new concept into cities, rooftop agriculture. While this has been much discussed at a conceptual level, there are only a few examples worldwide. Despite our market analysis finding that there are potential customers for such a product, it is prudent to adopt a cautious market entry strategy. Additionally, a number of startups aiming to bring agricultural technology into the city have failed.<sup>22</sup> Conscientious of this, Stadternte aims to take a lean, low initial capital entry into the market, as shown below in Figure 6.

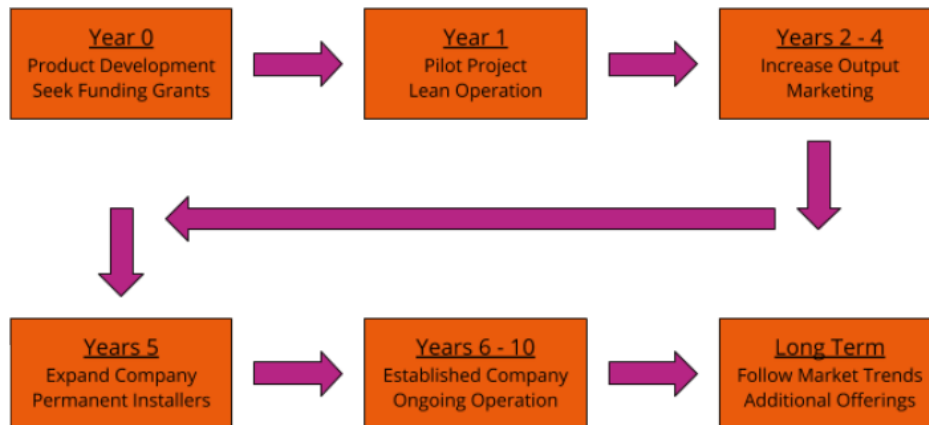


Figure 6: Overview of Stadternte's Market Entry Strategy

Initially Stadternte needs to finalize its offering and take advantage of any funding opportunities available for its first project. Once operational, Stadternte will begin with a Pilot Project to prove the product. For year 1 to year 4 the company will operate with minimal fixed costs, instead contracting the installation out to construction companies. After establishing itself, in year 5 Stadternte will internalize the installation by permanently employ the installers allowing for higher margins. From year 6 onwards Stadternte aims to have stable operation with a steady stream of projects to implement. Long Term Stadternte will follow market trends and develop additional offerings as appropriate for the company.



Figure 7: Example 3 Roof-top Greenhouse<sup>23</sup>

<sup>22</sup> (GABOR, 2018) (Frankfurter Rundschau, 2017)

<sup>23</sup> <https://www.pinterest.com/pin/441915782173505190/?lp=true>

## 7. Business Financial Plan

This section details the costs to establish and operate Stadterne, as well as its forecast revenue and total cash flow.

### 7.1. Cost Calculations

#### 7.1.1. Investment Costs

Beginning with the foundation of the company, to the acquisition of company-owned installation vehicles and tools after five years - the establishment of Stadterne requires several different investment costs. In the table below those costs are listed and categorized, according to the type of cost and whether they incur during the foundation in year 0, or the expansion of the business from subcontracting towards own installations in year 5.

Table 2: Cost calculation investment

Cost type	Cost name	Year 0	Year 5
Administrative	Foundation of Company	-€10,730	
Office Equipment	Computers	-€4,500	-€4,500
	Software Licenses	-€5,000	
Transport/ Installation Equipment	Company Car	-€30,000	-€60,000
	Installation Car (Van)		-€30,000
	Installation Tools		-€20,000
Overhead Costs	Shared Office Rental	-€5,400	
	Graphic Design	-€2,000	
	Website Design	-€2,000	
	Insurances	-€5,000	
Other	Contingency	-€10,000	
	Circulating Capital	-€10,000	
<b>Total</b>		<b>-€84,630</b>	<b>-€114,500</b>

The main investments in year 0 are the costs to establish the GmbH through a service provider *RPS Legal*<sup>24</sup>, the acquisition of a company car to reach subcontractors and customers and company-owned computers, including the required software licenses. Due to the change from subcontracting towards own installations, year 5 will require additional investments in a second company car (the car from year 0 will be depreciated until then and therefore be replaced), an installation car and tools. Total investment cost in year 0 add up to around 85,000 Euro, while in year 5 additional investments of almost 115,000 Euro are planned.

<sup>24</sup> <https://www.rpslegal.nl/>

### 7.1.2. Depreciation Costs

Depreciation rates are regulated by German law as the rates have a direct impact on the taxes. In the first four years, Stadternte will subcontract the installation to another company only from the fifth year onwards the installation tools will be used for the project. In addition, the number of the cars used will be increased from only one in the first four years to be three in total by the fifth year onwards.

Table 3: Depreciation costs

Item	Price	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cars	€30,000	€6,000	€6,000	€6,000	€6,000	€6,000	€18,000	€18,000	€18,000	€18,000	€18,000
Computers	€4,500	€900	€900	€900	€900	€900	€900	€900	€900	€900	€900
Installation Tools	€20,000	-	-	-	-	€2,000	€2,000	€2,000	€2,000	€2,000	€2,000
<b>Total/year</b>		<b>€6,900</b>	<b>€6,900</b>	<b>€6,900</b>	<b>€6,900</b>	<b>€8,900</b>	<b>€20,900</b>	<b>€20,900</b>	<b>€20,900</b>	<b>€20,900</b>	<b>€20,900</b>

### 7.1.3. Consumption Costs

A basic consumption cost is the total expenditure of associated utilities has been used to design and install a 1000 m<sup>2</sup> standard rooftop greenhouse. It includes the costs of hardware components (e.g. greenhouse materials, auxiliary systems for plumbing & controlling, commissioning, etc.) and related technical services such as site survey, planning approvals, structural assessment and detailed design. The on-going maintenance fee is estimated but is not counted into the total costs of related services because it is considered as a running cost of greenhouse which can be optionally provided on request.

An add-on consumption cost is the total expenditure of all additional or optional modules that are supplied on request and not taken into account of the main product's price.

All of costs are estimated based on the quoted prices of external suppliers or contractors. However, for the first four year of operation, the consumption cost includes the labor costs to install a greenhouse provided by *KTBL*. This cost has been removed in the basic model costs after the 5<sup>th</sup> year as Stadternte labor will install the greenhouse. The add-on consumption cost is also reduced based on the assumption that the input prices of additional modules are decreased at least 20% based on the long-term distribution agreements with the suppliers.

Table 4: Consumption Cost – 1000 m<sup>2</sup> Greenhouse

Component	Details	Amount
1000 m <sup>2</sup> Greenhouse	240 Euro per square meter	€240,000 <sup>25</sup>
Balance of System	Other costs (contingency) to include plumbing, controls, commissioning etc.	€24,000
Site Review	Do for free, write a proposal.	€800 <sup>26</sup>
Detailed Design	Designer to design greenhouse, internal reviews and approval	€4,000 <sup>27</sup>
Planning Approvals	Cost to manage city approvals, documentation etc.	€4,000 <sup>27</sup>
Structural Assessment	Structural Review of Building to ensure capacity for additional loads, consulted to engineer	€3,000 <sup>28</sup>

Table 5: Consumption Cost - Add on Modules

Component	Details	Amount
1000 m <sup>2</sup> Greenhouse	240 Euro per square meter	€240,000
Balance of System	Other costs (contingency) to include plumbing, controls, commissioning etc.	€24,000

<sup>25</sup> Cost estimate via *Kuratorium für Technik und Bauwesen in der Landwirtschaft* Greenhouse Cost Calculator, available at: [https://daten.ktbl.de/greenhouse/?tx\\_ktblsso\\_checktoken\[token\]=](https://daten.ktbl.de/greenhouse/?tx_ktblsso_checktoken[token]=)

<sup>26</sup> Assumes 16 hours of work at 50 Euro per hour.

<sup>27</sup> Assumes 10 full days (8 hours) at 50 Euro per hour.

<sup>28</sup> Estimated cost of third party engineer to review building structure for additional load on roof.

Table 6: Consumption Cost Breakdown 1000 m<sup>2</sup> Greenhouse

Component	Details	Amount	Type
Balance of System	Other costs (contingency) to include plumbing, controls, commissioning etc.	€24,000	Main Module
Rainwater Capture Module	With a range from 700 to 3000	€2,000	Optional module
Exhaust Heat Exchanger Module	Residential Air to Air Heat Exchanger \$2500 (box with lots of surface area and pipes). Triple it for commercial	€7,500	Optional module
Exhaust CO2 Injection Module	Only for Natural Gas Exhausts. Exhaust Diverter with controls Euro 4000; Exhaust Filter 500 Euro; Catalytic Converter 200 Euro; CO2 monitor 400 Euro	€5,100	Optional module
LED Lighting for Vegetable Growth	A total of 100 kW (100 x 1000W units)	€8,800	Optional module
Air Cycling Module	To cycle plant filtered air (if desired) into the building for clean air for occupant health.	€1,500	Optional module
Control and Monitoring System	Control for water, humidity, temperature and monitoring	€3,000	Optional module
<b>Total Base Price</b>		<b>€264,000</b>	
<b>Total complete Price</b>		<b>€291,900</b>	
<b>Cost of related technical services</b>			
Site Review	Do for free, write a proposal.	€800.00	Internal Sales Costs
Detailed Design	Designer to design greenhouse, internal reviews and approval	€4,000	Internal Sales Costs
Planning Approvals	Cost to manage city approvals, documentation etc.	€4,000	Costs of Services to Customers
Structural Assessment	Structural Review of Building to ensure capacity for additional loads, consulted to engineer	€3,000	Costs of Services to Customers
Ongoing Maintenance	Annual maintenance fee, based on EPA estimation which indicates the cost of installing a green roof at around \$10 per square foot for simpler extensive roofing and \$25 per square foot for intensive roofs.	€1,500	An add-on or optional service

Table 7: Final Product costs summary

Description	With External Contractors (before year 5)	With Employees (Year 5 and Beyond)
Consumption Cost Standard 1000 m <sup>2</sup> Model	€275,800 <sup>29</sup>	€185,800 <sup>30</sup>
Add-On Module Consumption Cost All the Add-Ons or Optional Modules	€27,900	€22,320

#### 7.1.4. Operational Costs

The main operational cost is assumed to be the marketing costs. The marketing plan will be exhibiting in the startup and urban planning trade fairs. Tax freelance consultant is calculated 20 hours per year at a €100 per hour and co-working office space will be rented with a monthly rent of €150 per person. The following table illustrates the total annual operation cost which is €22,900.

Table 8: Operational costs

Operational Costs	Cost
Tax Consultant - freelance	€2,000
Shared Office Rental	€5,400
Marketing Expenses	€10,000
Office Consumables	€2,500
Vehicle Costs	€3,000
<b>Total</b>	<b>€22,900</b>

#### 7.1.5. Financing Costs

The financial cost has been calculated for the three project per year for the first two years of operation. The Stadterne GmbH will require 50% of upfront deposit from the customers. The total required amount of finance is €1,494,958 and requested bank loan is €1,000,000. The 33% of the total investment will be own capital and 67% bank loan. The calculations have been made for 3% interest rate for the 10 years of credit period. The German government-owned development bank KfW offers so called “Gründerkredite”, with decent credit terms for start-ups.<sup>31</sup>

Table 9: Financing costs

<b>Total investment</b>	<b>€1,489,557</b>	
Own capital	€489,557	32.87%
Bank loan	€1,000,000	67.13%
Debt run-time	10	
Interest Rate	3%	

<sup>29</sup> Cost estimated via Kuratorium für Technik und Bauwesen in der Landwirtschaft Greenhouse Cost Calculator available at: [https://daten.ktbl.de/greenhouse/?tx\\_ktblsso\\_checktoken\[token\]=](https://daten.ktbl.de/greenhouse/?tx_ktblsso_checktoken[token]=)

<sup>30</sup> Cost also estimated from above calculator, but with labor costs removed (e.g. Stadterne Installers will do the installation, cost accounted for in internal costs)

<sup>31</sup> (KfW, 2018)

Repayment schedule with the 3% interest rate for the 10 years run time and falling annuity calculation has been shown below table.

Table 10: Bank loan payback schedule

Years	Balance of Debt	Interest rate	Interest cost paid p.a	Repayment p.a
1	€1,000,000	3%	€30,000	€100,000
2	€900,000	3%	€27,000	€100,000
3	€800,000	3%	€24,000	€100,000
4	€700,000	3%	€21,000	€100,000
5	€600,000	3%	€18,000	€100,000
6	€500,000	3%	€15,000	€100,000
7	€400,000	3%	€12,000	€100,000
8	€300,000	3%	€9,000	€100,000
9	€200,000	3%	€6,000	€100,000
10	€100,000	3%	€3,000	€100,000
<b>Total Interest</b>			<b>€165,000</b>	
<b>Total Repayment</b>				<b>€1,000,000</b>

## 7.2. Sales Price

After establishing the cost of the rooftop greenhouses Stadterne investigated the price to be profitable, while remaining reasonable for the customer. Based on research into greenhouse prices in Germany, mainly via the KTBL website<sup>29</sup>, the following sales prices in Table 11 were decided upon.

Table 11: Sales Price of Stadterne Greenhouses and Add-on Modules

Product	Price
1000 m <sup>2</sup> Greenhouse	€400,000
Complete set of Add-On Modules	€40,000

## 7.3. Business Cash flow

The forecast cash flow of Stadterne is presented below in Table 12.



Table 12: Business cash flow<sup>32</sup>

Revenue	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Greenhouse Sales Target <sup>33</sup>	0	1	2	4	4	6	6	6	6	6	6
Add-On Modules Sales Target <sup>34</sup>	0	0	1	2	2	3	3	3	3	3	3
Greenhouse Servicing	0	1	3	7	11	17	23	29	35	41	47
Revenue From Sales (R)	0	402,000	846,000	1,694,000	1,702,000	2,554,000	2,566,000	2,578,000	2,590,000	2,602,000	2,614,000
Costs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Investment Costs (Year 0 & 5)	-79,230	0	0	0	0	-114,500	0	0	0	0	0
Depreciation Costs	0	-6,900	-6,900	-6,900	-6,900	-8,900	-20,900	-20,900	-20,900	-20,900	-20,900
Financing Costs	0	-30,000	-27,000	-24,000	-21,000	-18,000	-15,000	-12,000	-9,000	-6,000	-3,000
Labor Costs	-146,843	-146,843	-146,843	-146,843	-146,843	-356,618	-356,618	-356,618	-356,618	-356,618	-356,618
Operational Costs	-22,900	-22,900	-22,900	-22,900	-22,900	-22,900	-22,900	-22,900	-22,900	-22,900	-22,900
Consumption Costs	0	-275,800	-579,500	-1,159,000	-1,159,000	-1,181,760	-1,181,760	-1,181,760	-1,181,760	-1,181,760	-1,181,760
<b>Sum of Costs (C)</b>	<b>-248,973</b>	<b>-482,443</b>	<b>-783,143</b>	<b>-1,359,643</b>	<b>-1,356,643</b>	<b>-1,702,678</b>	<b>-1,597,178</b>	<b>-1,594,178</b>	<b>-1,591,178</b>	<b>-1,588,178</b>	<b>-1,585,178</b>
Dividend	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Losses Carried Forward	0	-248,973	-80,443	0	0	0	0	0	0	0	0
Profit Before Tax (R - C)	-248,973	-80,443	62,858	334,358	345,358	851,323	968,823	983,823	998,823	1,013,823	1,028,823
Profit After Tax (Tax 30%, Keep 70%)	-248,973	-329,415	-17,585	234,050	241,750	595,926	678,176	688,676	699,176	709,676	720,176
Cash Flow (Net Profit + Depreciation)	-248,973	-336,315	-24,485	227,150	234,850	587,026	657,276	667,776	678,276	688,776	699,276
Financing Repayment	0	-100,000	-100,000	-100,000	-100,000	-100,000	-100,000	-100,000	-100,000	-100,000	-100,000
Dividend	-248,973	-436,315	-124,485	127,150	134,850	487,026	557,276	567,776	578,276	588,776	599,276
Net Cash Flow	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Net Cash Flow	-248,973	-685,288	-809,773	-682,622	-547,772	-60,746	496,530	1,064,305	1,642,581	2,231,357	2,830,633

<sup>32</sup> All values in Euro

<sup>33</sup> Each greenhouse refers to a 1000 m<sup>2</sup> Greenhouse Module

<sup>34</sup> Each Add-On Module package refers to one of each of the options being sold across all of the greenhouse sales that year.

The forecast cash flow and the net cash flow are visualized below in the following figures. These show, after the initial investments are recovered, that Stadterne is a potentially profitable business.

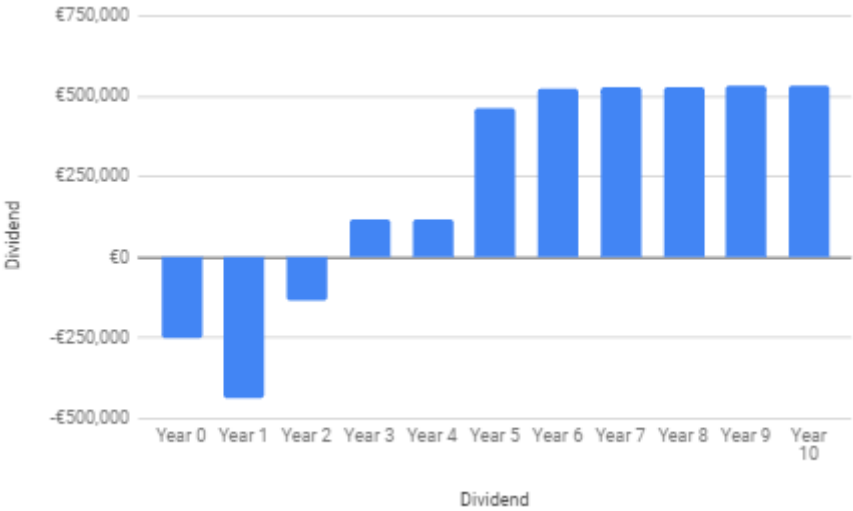


Figure 8: Dividend forecast for its first 10 years.

As detailed in Figure 8, first three years are going to produce losses for the company, this is due to the initial investments and low volume of projects until year 3. Once the volume of projects is adequate the company produces a modest dividend, which is used to expand the company and increase production after year 5.



Figure 9: The net cash flow of Stadterne for its first 10 years.

The net cash flow of the company is negative until year 6. The company starts returning a dividend after year 3, but it takes until year 6 to recover the losses from the first few years. The company requires an initial financing of €1,494,958, of which €494,958 will be self-financed and €1,000,000. By year 10 of operation the company forecasts a net cash flow of around €2,800,000.

It is worth noting that Stadterne is dependent on low number of projects. If fewer projects come through, especially in the early years, profits will be reduced or even losses incurred. The company needs to sell 3 greenhouses per year to break even (both before and after the expansion). As such the timing of the market entry is crucial to ensure that an adequate stream of projects exist.

## 8. Company Structure

### 8.1. Legal form

There are various legal forms commonly used for starting and managing a business in Germany which can be categorized in two main types: Corporations and Partnerships. A brief overview of the forms of company and partnership is showed in the Table 13: Legal Company forms in German.

Table 13: Legal Company forms in Germany<sup>35</sup>

Legal/Establishment Form	Minimum Number of Partners	Minimum Share Capital	Legal Liability	Establishing Formalities
<b>Forms of Corporation</b>				
Limited Liability Company (GmbH)	One partner	EUR 25,000	Liability limited to share capital	Moderate
Limited Liability Entrepreneurial Company ("Mini GmbH")	One partner	EUR 1	Liability limited to share capital	Low-moderate
Stock Corporation (AG)	One partner	EUR 50,000	Liability limited to share capital	Moderate-high
Partnership Limited by Share (KGaA)	Two partners: general partner and limited shareholder	EUR 50,000	General partner: personal unlimited liability Limited shareholder: limited share liability	Moderate-high
<b>Forms of Partnerships</b>				
Civil Law Partnership (GbR)	Two partners	Not required	Personal unlimited liability	Very low
General Commercial Partnership (oHG)	Two partners	Not required	Personal unlimited liability	Low-moderate
Limited Partnership (KG)	Two partners: general partner and limited partner	Not required	General partner: personal unlimited liability Limited partner: limited share liability	Low-moderate
GmbH & Co. KG	Two partners: general partner (GmbH) and limited partner (the general partner is typically the limited partner of the KG)	Not required	General partner (GmbH): personal unlimited liability Limited partner: limited share liability	Moderate-high

<sup>35</sup> German Trade & Invest - GTAI, Retrieved from [www.gtai.de](http://www.gtai.de)

Considering the administration required, liability and fund raising, Stadterne will be established in the form of a German limited liability company (*Gesellschaft mit beschränkter Haftung, GmbH*) private limited company is a private company that is limited by shares. The minimum share capital required is EUR 25,000. At the time of registration, at least half of the minimum capital (i.e. EUR 12,500) must be actually and verifiably contributed on a bank account. A private limited company is a private company that is limited by shares. The minimum share capital required is EUR 25,000. At the time of registration, at least half of the minimum capital (i.e. EUR 12,500) must be actually and verifiably contributed on a bank account.

According to the law, the formation procedure of the GmbH company is uncomplicated, as it is established by the founding shareholder(s) executing a deed of formation and articles of association in the presence of a notary. The Stadterne GmbH's formation is also set up with three shareholders and one managing director. Articles of association is provided in the Annex 1.

## 8.2. Legal Considerations

In the establishment phase of the company and prior to assumption of commercial activities, Stadterne will be registered in the public commercial register (*Handelsregister*) and the local trade office (*Gewerbe-/Ordnungsamt*). The company is managed and legally represented by a managing director. The shareholders exercise direct influence on the company management by issuing binding instructions or directions to the managing director.

As the GmbH registered company, in the cases of company failure, the company's liability is restricted to its assets and shareholders' liability is limited to the amount of share capital invested. Shareholders' personal property is protected.

The GmbH company is liable to corporate income tax, solidarity surcharge and trade tax. Corporate income tax is levied as a flat nationwide tax at a rate of 15 percent of taxable corporate income. The solidarity surcharge (*Solidaritätszuschlag*) is added on top of the corporate income tax with the rate of 5.5 percent, creating a total of 0.825 percent of taxable income. Thus, corporate income tax and solidarity surcharge add up to a total of 15.825 percent. In addition, the trade tax in Germany is currently set at between 7 and 17 percent depending on state taxation regulations.

A contract form of employment is also drawn up in writing, which sets out the terms and conditions of the relationship between the company with employees. All of general working conditions such as working times, vacation & public holidays, sick or maternity leave as well as social security insurance are complied with federal and state regulations of employment. Wages or salaries are basically subjected to individually negotiation. A form of employment contract is provided in Annex 2.

## 8.3. Business Location

As described in chapter Business Strategy, in the first years Stadterne will operate with minimal fixed costs, to increase cost-competitiveness and operate economical. The sub-contracting of the different component installations of the rooftop greenhouses does not require big office spaces, therefore co-working spaces can be a promising alternative to buying or renting in the first years. The German chamber of industry and commerce's organizes the intermediation between co-working spaces and startups in Cologne. With average costs of only 150 Euro per person and month, Stadterne will be able to use

well-equipped office rooms.<sup>36</sup> In case the co-working spaces are not sufficient enough after some years, the rental of own office spaces can be considered.

#### 8.4. Social insurance plan

The German system of social insurance is a mandatory system for the residents in Germany. A social insurance is considered in the financing calculations over a 10 years period for all the employees.

##### 1. Health insurance

According to the German law, a percentage of 14.6% of the employee's salary is to be deducted to the health insurance. 50 percent of that is covered by the employer and the rest is covered by the employee himself.

##### 2. Long term care insurance

The Long-term care is another compulsory part in the social insurance with a percentage of 2.55% of the overall income. This insurance covers the long term nursing in the case of serious illness.

##### 3. Pension Insurance

The retirement plans in the social insurance system in Germany represents 18.7% of the gross monthly salary, with a 50-50 percentage between the employee and the employer.

##### 4. Unemployment insurance

In the case of unemployment for the period of 12 months, a monthly support can be received from the government with this insurance. The contributions of the unemployment insurance is 3%, 50 percent is deducted from the employee and 50 percent is covered by the employer.

The following table is the calculation of all the insurances covered by the Stadternte. It is assumed that Stadternte will operate till the 4th year with 3 employees (manager, designer and a sales person). From the 5th year onwards, the working capacity is assumed to be increased which will require more manpower (manager, 2 designers, 2 sales persons and 3 installers).

Table 14: Stadternte personnel insurance costs

Employee	Manager	Designer	Sales Person	Installer
Net-Salary (€)	45,000	30,000	30,000	30,000
Pension insurance <b>18.7%</b>	8,415	5,610	5,610	5,610
Unemployment insurance <b>3%</b>	1,350	900	900	900
Long term insurance <b>2.55%</b>	1,147.5	765	765	765
Health insurance <b>15.6%</b>	7,020	4680	4680	4,680
Insurance Costs Total <b>39.85%</b>	17,932.5	11,955	11,955	11,955
Total Employee Cost (€)	<b>62,932.50</b>	<b>41,955</b>	<b>41,955</b>	<b>41,955</b>

<sup>36</sup> (IHK, 2018)

## 9. Conclusion

The business evaluation of Stadterne finds that the company can be a profitable business. The technological feasibility, paired with the increasing awareness for local and sustainable food production, creates an interesting market niche for our business.

Considering the currently still low popularity of roof-top gardening in Germany, Stadterne extends the idea from an agricultural-only perspective, towards a holistic approach, which improves the value of buildings and urban spaces. Reduced heating/cooling costs, higher building efficiency rating and increased property value are just some of the benefits that come along with our products.

With regard to the high level of innovation, our business will use the first years to gain experiences in a completely new market. The timing of market entry is crucial for Stadterne's success. From Stadterne's estimates there are some 300 rooftops in Germany ready to adopt a Stadterne greenhouse. The challenge for Stadterne will be finding and contacting these customers. As the company depends on a low number of projects, should any of these not eventuate then the company will risk running losses. As such the company will only be fully launched once some warm leads are established. To minimize this risk, initially Stadterne will sub-contract the construction of the greenhouses, enabling Stadterne to operate with minimal overhead costs, while also offering the customers a most reliable and economic solution for their roofs.

From year 5 on, Stadterne will shift its business and consequently internalize the installations. Based on the gained experiences, Stadterne will be in the position to design and install its own roof-top greenhouse system. This business expenditure goes along with a higher number of employees, for example hiring own installers, but also with bigger margins.

As described in section *Business Cash flow*, the company will produce losses in the first three years, due to the initial investments and low volume of projects until year 3. With the volume of projects increasing, Stadterne will produce a modest dividend and can realize the above-mentioned expansion plans. Compared to the dividend, the net cash flow of the company is expected to be negative until year 6. Although the business produces a dividend after year 3, the losses can only be recovered from year 6 on. To break even Stadterne must sell 3 greenhouses in any given year.

Assessing the business feasibility of Stadterne highlights the great market potential for roof-top greenhouse installations in Germany, although the market for this is in an early, unexperienced stage. The first years must be seen as the "critical" phase, in which no profits can be generated yet and the financial income depends mainly on a low number of projects. After this, the chance for a successful business look bright and can be considered worth the initial risk.

## 10. References

- Bianchini, F. and Hewage, K. (2012) 'Probabilistic social cost-benefit analysis for green roofs: A lifecycle approach', *Building and Environment*. Elsevier Ltd, 58, pp. 152–162. doi: 10.1016/j.buildenv.2012.075.
- Brockdorff, P. von et al. (2017) 'LifeMedGreenRoof Project Socio-Economic Report'.
- Buehler, D., & Junge, R. (2016). Global trends and current status of commercial urban rooftop farming. *Sustainability*, 8(11), 1-16.
- H.F. Castleton, V. S. (2010). Green roofs; building energy savings and the potential for retrofit. *Energy and Buildings* (42), 1582–1591.
- Chinadialogue.net. (2017). Retrieved from <https://www.chinadialogue.net/article/show/single/en/9979-Germany-s-green-roofs-offer-lesson-on-climate-change-adaptation>.
- IHK Köln. Coworking spaces im IHK-Bezirk Köln (2018). Retrieved from [https://www.ihk-koeln.de/Coworking\\_Spaces\\_in\\_Koeln.AxCMS](https://www.ihk-koeln.de/Coworking_Spaces_in_Koeln.AxCMS)
- David Sanjuan-Delmás, P. L.-M.-M. (2018). Environmental assessment of an integrated rooftop greenhouse for food production in cities. *Journal of Cleaner Production*, Volume 177, Pages 326-3337.
- Francesco Orsini, D. G. (2014). Exploring the production capacity of rooftop gardens (RTGs) in urban agriculture: the potential impact on food and nutrition security, biodiversity and other ecosystem services in the city of Bologna. *Food Security*, Volume 6, pages 781–792.
- Frankfurter Rundschau (2017), Frankfurter Garten ist insolvent, Retrieved from <http://www.fr.de/frankfurt/urban-gardening-frankfurter-garten-ist-insolvent-a-1263296>
- Branchenportal für den Gartenbau, GABOR (2018), NL Dachfarm insolvent, Retrieved from <https://www.gabot.de/ansicht/nl-dachfarm-insolvent-392342.html>
- Grard, B. J.-P., Chenu, C., Manouchehri, N., Houot, S., Frascaria-Lacoste, N., & Aubry, C. (2018). Rooftop farming on urban waste provides many ecosystem services. *Agronomy for Sustainable Development*, 38(1),
- Grunwald L et al. (2017, March). A GIS-based mapping methodology of urban green roof ecosystem services applied to a Central European city. *Urban Forestry & Urban Greening*, Volume 22, Pages 54-63.
- IEA. (2018). Retrieved from <https://www.iea.org/etp/tracking2017/industry/>. KfW (2018), ERP Gründerkredit, Retrieved from, [https://www.kfw.de/inlandsfoerderung/Privatpersonen/-Gr%C3%BCnderkredit/Erweitern/F%C3%B6rderprodukte/ERP-Gr%C3%BCnderkredit-Universell-\(073\\_074\\_075\\_076\)/](https://www.kfw.de/inlandsfoerderung/Privatpersonen/-Gr%C3%BCnderkredit/Erweitern/F%C3%B6rderprodukte/ERP-Gr%C3%BCnderkredit-Universell-(073_074_075_076)/)
- Liu, T., Yang, M., Han, Z., & Ow, D. W. (2016). Rooftop production of leafy vegetables can be profitable and less contaminated than farm-grown vegetables. *Agronomy for Sustainable Development*, 36(3), 41.
- Lufa Farms. (2018). Retrieved January 2, 2019, from <https://montreal.lufa.com/en/farms>.

Marketing Concept, GP Global Ltd, (2018) <http://www.gpglobalcy.com/default.aspx?articleid=1190>

NRWinvest. (2018). Retrieved from <https://www.nrwinvest.com/en/nrw-as-location/this-speaks-well-for-nrw/industrial-heartland-of-germany/>.

O. Pons et. al, 2015, Roofs of the Future: Rooftop Greenhouses to Improve Buildings Metabolism, Procedia Engineering, Volume 123, Pages 441-448,

USGSA (United States General Services Administration) (2011) 'A Report of the United States General Services Administration The Benefits and Challenges of Green Roofs on Public and Commercial Buildings', (May). Available at: [http://www.gsa.gov/portal/mediaId/158783/fileName/The\\_Benefits\\_and\\_Challenges\\_of\\_Green\\_Roofs\\_on\\_Public\\_and\\_Commercial\\_Buildings.action](http://www.gsa.gov/portal/mediaId/158783/fileName/The_Benefits_and_Challenges_of_Green_Roofs_on_Public_and_Commercial_Buildings.action).

Die Welt, §Warum immer mehr Deutsche Hobby Gärtner werden", (2011) [https://www.welt.de/die-weltbewegen/oekologische\\_verantwortung/article13704553/Warum-immer-mehr-Deutsche-Hobby-Gaertner-werden.html](https://www.welt.de/die-weltbewegen/oekologische_verantwortung/article13704553/Warum-immer-mehr-Deutsche-Hobby-Gaertner-werden.html)



## 11. Annex

### 11.1. Stadterne - Articles of Association

# ARTICLES OF ASSOCIATION of Stadterne GmbH

## § 1

### Company name, Registered Offices

1. The name of the company is  
**Stadterne GmbH.**
2. It has its registered offices in Cologne, Germany.

## § 2

### Object of the Company

1. The Company is a Holding which operates in the area of rooftop greenhouses. The object of the Company is in particular the:
  - (1) designing of rooftop greenhouses;
  - (2) construction operation of rooftop greenhouses;
  - (3) maintenance and support service of rooftop greenhouses;
  - (4) other urban agriculture opportunities as a company;
2. The Company is entitled to pursue all business and carry out all measures which appear to serve its object. It may establish branches or subsidiaries abroad or participate in other activities it deems profitable and consistent with its mission, vision and values. The Company is entitled to transfer or relinquish its business fully or partially to other companies, to conclude company agreements and enter into co-operations.

### **§ 3**

#### **Business year; Duration of the Company**

1. The business year is the calendar year.
2. The Company is founded for an indefinite period.

### **§ 4**

#### **Share capital;**

The share capital of the Company amounts to 489,557 Euro.

### **§ 5**

#### **Managing Director**

The company shall have one managing director. The managing director of Stadterne GmbH is Person A.

### **§ 6**

#### **Representation**

The company is to be represented legally by the managing director. The managing director may grant, in writing, the authority to represent the company to a procurist, provided representative actions are signed off by two regular employees of Stadterne.

### **§ 7**

#### **Announcements**

Announcements are to be published on the Stadterne website.

### **§ 8**

#### **Costs of Foundation**

All initial founders shall bear the costs of incorporation.

### **§ 9**

#### **Final Provisions**

This contract can only be changed in a written form.

These articles of association shall be governed by the laws of the Federal Republic of Germany.

In case of any discrepancies between the German and the English version the German version of these articles of association shall prevail.

## 11.2. Working contract

### **Employment Agreement (Stadterne)**

THIS AGREEMENT made as of the \_\_\_ day of \_\_\_, 20\_\_\_, between Stadterne a corporation incorporated under the laws of the federal state of North Rhine-Westphalia, and having its principal place of business at \_\_\_\_\_ (hereafter referred to as the "Employer"); and \_\_\_\_\_ [name of employee] (hereafter referred to as the "Employee").

WHERE the Employer desires to obtain the benefit of the services of the Employee, and the Employee desires to render such services on the terms and conditions set forth.

IN CONSIDERATION of the promises and other good and valuable consideration (the sufficiency and receipt of which are hereby acknowledged) the parties agree as follows:

#### **1. Employment**

The Employee agrees that he will at all times faithfully, industriously, and to the best of his skill, ability, experience and talents, perform all of the duties required of his position. In carrying out these duties and responsibilities, the Employee shall comply with all Employer policies, procedures, rules and regulations, both written and oral, as are announced by the Employer from time to time. It is also understood and agreed to by the Employee that his assignment, duties and responsibilities and reporting arrangements may be changed by the Employer in its sole discretion without causing termination of this agreement.

The period of employment is to begin on the \_\_\_ day of \_\_\_, 20\_\_\_.

#### **2. Position Title**

*\*For Manager\**

As a \_\_\_ Manager \_\_\_, the Employee is required to perform the following duties and undertake the following responsibilities in a professional manner:

(a) Represent the company before all manner of judicial, administrative or labor authorities with the powers mentioned in the article of Association of the company.

(b) Carry out all pertinent actions and operations to fulfill the corporate purpose.

(c) Decide on expenses that must be incurred with a charge to the Company's budget.

(d) Execute and sign all manner of public or private contracts, agreements or documents and issue credit instruments according to the terms of the German General Law of Credit Instruments and Operations, whether issuing, accepting, endorsing, or guaranteeing them or to collect their amount or assume obligations on behalf of the company, to take out loans and open bank accounts or accounts of another nature on behalf of or for the account of the company.

(e) Other duties as may arise from time to time and as may be assigned to the manager.

*\*For other employees\**

As a \_\_\_\_\_, the Employee is required to perform the following duties and undertake the following responsibilities in a professional manner.

- a. -
- b. -
- c. -
- d. -
- e. Other duties as may arise from time to time and as may be assigned to the employee.

### **3. Compensation**

- a. As full compensation for all services provided the employee shall be paid at the rate of \_\_\_\_\_. Such payments shall be subject to such normal statutory deductions by the Employer.
- b. Based on annual performance, assessed by the company's directors, should the employee perform satisfactorily in all above duties and behave in align with the employers "Mission, Vision and Values" they will be granted a 13th Salary in the month of December (equal to their monthly salary).
- c. The salary mentioned in paragraph (I)(a) shall be reviewed on an annual basis.
- d. All reasonable expenses arising out of employment shall be reimbursed assuming same have been authorized prior to being incurred and with the provision of appropriate receipts.

### **4. Vacation**

The Employee shall be entitled to vacations to the amount of 24 working days per calendar year. Where these are not used, the unused days shall accrue into the following calendar year, to the maximum of 48 available vacation days. Working days are as defined by German employment law.

### **5. Benefits**

The employee is entitled to a 50% payment towards health insurance as per German law. A percentage of 14.6% of the employee's salary is to be deducted to the health insurance. The remaining is covered by the employee.

### **6. Probation Period**

It is understood and agreed that the first ninety days (calendar days) of employment shall constitute a probationary period during which period the Employer may, in its absolute discretion, terminate the Employee's employment, for any reason without notice or cause.

### **7. Performance Reviews**

The Employee will be provided with a written performance appraisal at least once per year and said appraisal will be reviewed at which time all aspects of the assessment can be fully discussed.

## **8. Termination**

- a. The Employee may at any time terminate this agreement and his employment by giving not less than two weeks written notice to the Employer. One additional weeks' notice is required for each year worked by the employee, to a maximum of eight weeks' notice.
- b. The Employer may terminate this Agreement and the Employee's employment at any time, without notice or payment in lieu of notice, for sufficient cause.
- c. The Employer may terminate the employment of the Employee at any time without the requirement to show sufficient cause pursuant to
- d. The employee agrees to return any property of\_\_\_\_at the time of termination.

## **9. Non- Competition**

(1) It is further acknowledged and agreed that following termination of the employee's employment with the employer for any reason the employee shall not hire or attempt to hire any current employees of the employer .

(2) It is further acknowledged and agreed that following termination of the employee's employment with for any reason the employee shall not solicit business from current clients or clients who have retained in the 12-month period immediately preceding the employee's termination.

## **10. Laws**

The employer and the employee agree to work under the relevant German employment law, which in the event of an inconsistency takes precedence over this agreement. Both parties agree to agree to act in good faith to follow Germany employment law.

## **11. Independent Legal Advice**

The Employee acknowledges that the Employer has provided the Employee with a reasonable opportunity to obtain independent legal advice with respect to this agreement, and that either:

- a. The Employee has had such independent legal advice prior to executing this agreement, or;
- b. The Employee has willingly chosen not to obtain such advice and to execute this agreement without having obtained such advice.

## **12. Entire Agreement**

This agreement contains the entire agreement between the parties, superseding in all respects any and all prior oral or written agreements or understandings pertaining to the employment of the Employee by the Employer and shall be amended or modified only by written instrument signed by both of the parties hereto.

**13. Severability**

The parties hereto agree that in the event any article or part thereof of this agreement is held to be unenforceable or invalid then said article or part shall be struck and all remaining provision shall remain in full force and effect.

*IN WITNESS WHEREOF the Employer has caused this agreement to be executed by its duly authorized officers and the Employee has set his hand as of the date first above written.*

*SIGNED, SEALED AND DELIVERED in the presence of:*

[Name of employee]

[Name of Employer Rep]

[Signature of Employee]

[Signature of Employer Rep] [Title]