

# National Strategy to Increase Foreign Direct Investment in Ukraine

## Section 2: The NEXT 10

*New global trends that could be developed in Ukraine*

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# Disclaimer

# Section 2

## 2.6. The NEXT 10





## Contents

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### **SECTION 2 - THE NEXT 10**

**3**

#### Executive Summary

5

2.6.1. Next generation construction materials

11

2.6.2. High energy density batteries

14

2.6.3 Healthcare Infrastructure

17

2.6.4 Hydrogen

20

2.6.5 Connected health

23

2.6.6. Port automation, innovative waterborne freight transportation

26

2.6.7. EV charging stations infrastructure

29

2.6.8. Smart waste management

32

2.6.9. Plant-based meat

35

2.6.10. Carbon sequestration

38



## The Next 10 - Introduction

Matching the new global sector and technological trends against Ukrainian capabilities is no easy feat. For one, there's a myriad of new technological developments around the world that seem to be the Next Big Economic Breakthrough. Many of those are geo-agnostic – they do not depend on specific geography but rather on the availability of corresponding financial and intellectual resources ready to be injected into a specific idea by willing corporates and governments. Hence, one could simply take any of those hundreds of promising trends and artificially 'plant' them in Ukrainian reality.

As tempting as this approach is, it serves little purpose within the framework of the FDI enhancement Strategy. Our aim was to carefully review and handpick those trends that match three major criteria:

- Falling under the three key megatrends (digitalization, sustainability, reconfiguration of supply chains) or addressing the new global post-COVID reality
- Matching geography and economy-specific advantages of Ukraine
- Being a potential source of FDI

Ukraine, obviously, doesn't have enough cutting-edge technological ecosystem and infrastructure to support systemic development of Robotics, BioTech, or any of the other Deep R&D niches that require a well-established combination of world-class scientific institutions, multi-billion laboratory, testing grounds investments, and abundance of local interest and capital. These elements don't appear overnight – it usually takes decades of dedicated work to establish such ecosystems and make their results material significant to the world.

Hence, where Ukraine could truly find its own voice is in partaking in those trends that make use of its 'natural affinities.' Major transportation and energy networks (including nuclear energy capacities), access to the sea and one of the largest European rivers resulting in rich shipping and ship maintenance history, key global agriculture producer, one of the largest populations in Europe, pressing need to modernize fundamental infrastructure on a national scale – all these factors provide keys to the 'trend matching' game.

Importantly, some of the trends laid out further aren't cutting-edge technology (or technology-focused at all) – Ukraine has a long way to go yet to be able to host systemic technological clusters. Instead, we selected those trends that could both be realistically implemented in Ukrainian conditions and be of use first and foremost to Ukraine's own market and economy.

The ideas presented on the next pages aren't shown in any priority order. Moreover, a detailed analysis of how to develop those trends in Ukraine would be similar to the major sectoral analyses we provide elsewhere in this Strategy – for each specific trend. Instead, the overviews below are meant as 'food for thought' – and potential talking points for discussions with various investors, ranging from short-term to relatively futuristic.



## Executive summary (1/5)

### Next generation construction materials

**Global construction market** is projected to grow. The growth of the infrastructure and building industry will significantly influence the development of **innovative construction materials**. Next generation materials will shape the future of construction, enabling innovative, sustainable, and cost-effective approach in the industry.

Application of new **eco-friendly** construction materials is becoming one of the important solutions in addressing urgent environmental challenges. Development and application of materials **resistant to different severe conditions**, as well as the introduction of cheaper and less resource-intensive materials is also a long-term trend. Employing **new technologies** (IoT, 3D printing, AI, etc.) in the construction process enables creation of next generation materials and architecture solutions. Newest **innovative** materials provide a possibility to construct new forms and designs and give room for further developments and new approaches in the industry.

**Ukraine** has a major internal market for construction materials, and modernization of infrastructure is a national priority. Variety of enablers like close geographical location to Europe; facilities that may be useful for launching the R&D centers, laboratories, new construction materials factories; volume of raw materials and volume of produced materials, that may be potentially interesting for construction; low labor and operating costs in comparison with European peers, and other factors demonstrate the country's **potential for attracting investments in the industry**.

### High energy density batteries

Development and usage of the alternative means of energy storage is gaining momentum globally, paving the way for rapid R&D in the high energy density batteries (HEDB) sector. HEDB may become an alternative long-lasting source of energy for different types of electronics and electric vehicles.

**Global battery market size** is projected to grow with a CAGR of 10.6% during 2020-2025. Rapid development of the electric vehicles industry significantly affects the volume of the **Lithium-ion batteries market**. Global Lithium-ion battery market is projected to grow with a CAGR of 13% during 2020-2027. Lithium batteries are currently the fastest growing type of batteries. Overall, a number of spheres, where high density batteries may be applied, is growing fast and dynamically. Decreasing battery production costs significantly drives the increasing implementation of batteries in different industries.

Subject to thoughtful and structural market positioning and promotion of key enablers (like low labor costs, large STEM-focused workforce, relatively low operating costs in comparison with the peer countries, availability of raw materials – in particular, lithium), Ukraine could host systemic investments in the high energy density batteries industry that is yet to be developed locally.

Additionally, with a more futuristic point of view, Ukraine could be a prime location for **nuclear waste-based batteries research and manufacturing**, given Ukraine's nuclear plant network and the nuclear waste storage facility recently constructed in Chernobyl.



## Executive summary (2/5)

### Healthcare Infrastructure

Globally, healthcare is experiencing continuously **increasing pressure** caused by the **growing and aging population** in conjunction with the alarming **growth of chronic diseases and conditions**.

Throughout 2020, the state of play described above has been exacerbated by what many have previously discounted as a virtual risk – **a true pandemic**. The way it unfolded brought systemic concerns of global **healthcare infrastructure capacity** – and prioritized the sector like nothing else since post World War era.

The Ukrainian healthcare sector, like many others, is a remnant of the Soviet times, with the bulk of infrastructure being state-owned and run-down. The sector is currently in the middle of the transformation initiated by the government in 2018, aiming to make healthcare services **better and more accessible** through **modernization and digitalization** of the industry.

Coupled with the drive to **increase private healthcare share**, this might bring significant market opportunities – in particular, around the **privatization of or public-private partnerships for state-owned/municipal clinics**. Several trends and developments enhance the overall opportunity:

- **Medical tourism** to Ukraine is on the rise - Ukraine offers high-quality services in the fields of stomatology, ophthalmology, and reproductive medicine **at highly competitive costs** attracting more and more medical tourists each year;
- Digitalization of the healthcare services is also a priority – and in many instances, already **exceeds the digital capabilities offered by many European countries**.

### Hydrogen

The hydrogen sector is gaining importance due to the prevalence of the **global decarbonization and sustainability mega-trend**. Globally, demand for hydrogen is continuously increasing as a consequence of all-out industry support and further fueled by the rapid development of renewable energy, pushing hydrogen production costs down.

It is expected that hydrogen will show remarkable long-term growth due to its unparalleled versatility. Use cases range from heavy machinery to transportation, allowing for the integration and consolidation of the energy systems.

The Ukrainian hydrogen sector is **deemed** to have **remarkable potential** due to several reasons. First of all, Ukraine has large renewable energy production capacities, which is the main prerequisite for efficient hydrogen production. Moreover, large energy companies like Naftogaz and DTEK are highly interested in hydrogen-related projects creating **numerous partnership opportunities**. Lastly, there is **strong support** both from the **Ukrainian government** and the **EU**.

The Ukrainian government is planning to develop a strategy for widespread implementation. The EU included Ukraine in its **plans** on the implementation of hydrogen and has shown preliminary readiness to provide both financial and consulting assistance for the implementation of hydrogen-related projects in Ukraine.

What makes the hydrogen niche particularly unique for Ukraine is Ukraine's **critically important vast gas pipeline network**, which, with certain modernizations, could be used both as **testing grounds and full-scale infrastructure** for hydrogen delivery.

## Executive summary (3/5)

### Connected health

Globally, the connected health industry is in a **state of rapid growth and development** due to the **emergence of modern technologies** like IoT, AI, and Big Data. The industry is focused on making tools and instruments that make healthcare services better and more efficient. Two key segments are deemed to be the future of healthcare:

Use of deep R&D into Artificial Intelligence (neural networks) coupled with easy wearable data collection from patients to fast-forward drug development and disease identification that earlier took decades.

Real-time medical support through wearable devices ranging from household self-diagnostics to systemic clinical use. The latter has been particularly strongly affected by the COVID pandemic, where traditional healthcare infrastructure is short on capacity, and self-diagnostics through trusted systems take precedence.

The Ukrainian sector of wearable devices is at the **early development stage**, with a small number of startups present in the industry. Currently, **no production facilities or R&D centers** are operating **in the industry** of connected health. Yet, Ukraine is deemed to have vast potential in the industry. The **labor force** in Ukraine is **highly skilled** with a **strong knowledge base** in IT-related topics and a long history of excellent mathematics and strong medical tuition.

In addition, it is expected that **domestic demand** for industry products **will grow** in the mid-term due to the **ongoing reforms** focused on making the Ukrainian **healthcare system** more **digital** and **innovative**.

### Innovative waterborne freight transport and port automation

Waterborne freight is **becoming** more and **more autonomous** as ships and ports globally strive towards technological integration as a result of the implementation of **IoT-related tech**. Moreover, the industry is **actively implementing “green” technologies** to make shipping operations more **efficient** and **eco-friendly**. The industry is also experiencing substantial **pressure on ships’ capacity** due to the growing population and **shipping costs**, pushing the **companies** to look for **new technology-driven solutions**. Expectedly, **port automation** is on the **rise** due to the **increasing required throughput** and **regulatory pressures**. **Automation** helps ports operate **more efficiently** and keep **emissions at acceptable levels**.

Ukraine is uniquely positioned to benefit from the trend. With **significant access to the sea and one of the largest European rivers** running through its territory and connecting to the sea, the Ukrainian market of waterborne freight transportation is poised to expand. The recent introduction of the new law on river transportation is expected to streamline and **stimulate the industry**.

Ukraine has a **rich history of shipbuilding** and **ship repair**, with numerous facilities and education institutions scattered across the Southern regions of the country. While a lot of Soviet-era expertise has been lost, the existing infrastructure is well-positioned to be used as **testing grounds** and **production facilities for incoming investors**. **Ukrainian ports** can also be seen as attractive targets for developing and testing port automation due to the **concession laws** that allow companies to **acquire port facilities** from the government **at favorable terms**.





## Executive summary (4/5)

### EV charging stations infrastructure

Rapid projected growth of **the global passenger EV fleet** (expert consensus on expected growth is 15-20X during 2020-2030) affects the necessity to deploy **the broader public charging infrastructure**. Global sustainability agenda, declining battery costs, development of faster charging solutions, and other factors significantly drive the increase of the EV market.

This, in turn, **requires significant investments** in the infrastructure, both residential and public. There is a trend for deploying **a wide array of public places to charge**: workplace charging, intracity charging stations, curbside charging, destination charging, etc.

EV charging infrastructure is also growing in Ukraine. The local electric car market has shown significant growth in recent years, assisted by import duty exemptions. World Bank is initiating a comprehensive study of the development of electric public transport infrastructure in Ukraine. The project is planned to be implemented at the end of June 2021.

Several companies emerged over the past 5 years looking to deploy EV charging station networks in Ukraine; **the effort is also now joined by the traditional fuel retailers**. However, in order to boost EV growth in Ukraine, a much **wider national-scale infrastructure of public charging stations is required**.

This provides unique market entrance opportunities for very different investor groups: **equipment makers, network operators, technology startups** looking to validate their tech in low-cost conditions.

### Smart waste management

Smart waste management is a necessity for modern cities that are facing the continued urbanization challenges related to the rising amount of waste and are searching for more **sustainable and cost-efficient solutions**.

Modern technologies are among the key enablers for smart waste management. The amount of **global** waste is expected to grow significantly (to 3.40 billion tons by 2050). This requires **new solutions and sustainable waste management approaches**. Application of the circular economy approach, switching over natural and reusable packaging, active development of the new technologies connected with the whole waste management lifecycle are among the current smart waste management trends globally.

The problem of proper waste management in **Ukraine** is critical. Resource-intensive multi-waste industrial production, absence of necessary infrastructure for effective waste management, the minimum percentage of the total amount of waste that is recycled, and other existing problems need urgent attention and solutions. Ukraine needs investments in modern infrastructure and up-to-date methods of household and industrial waste management.

Researchers (startup teams), civil society, and environmental activists contribute to the development of smart waste management in Ukraine. In addition, there are a number of enablers (geographical location, low labor costs, etc.) that make Ukraine a good place for **investments in the development of smart waste management technologies** and the construction of recycling plants.

## Executive summary (5/5)

### Plant-based meat

The global industry is in the **stage of early development** as the first plant-based meat product was sold in 2016. Yet, the industry has been **growing** at a rate of **38% per year**, indicating the **vast potential** of the sector.

**Health concerns** are among the **main trends** behind the growing consumption of plant-based meat as people search for healthier meat substitutes. Moreover, **plant-based meat** is one of the **best ways** to **deal** with the **emissions** problem **associated with cattle breeding**, one of the global leaders in carbon oxide emissions. The **growing population** and **inevitable contraction of the global meat supply** also stimulate long-term demand for plant-based meat, creating a need for meat substitutes.

**The industry** of plant-based meat is **nearly absent in Ukraine**, with only two startups and one international player present in the sector. Moreover, **existing food regulations** do not include plant-based meat as a category, creating a substantial barrier for sector development. Yet, there are several factors driving potential:

- One of the startups received **funding** from a large domestic **agricultural company**, indicating general interest among domestic agricultural companies
- **HoReCa venues** are actively **introducing plant-based meat meals** in their menus, showing the growth in demand for plant-based meat
- **Ukrainian people** are **becoming** more and more **interested in alternative diets**.

### Carbon sequestration (CCS)

Globally, the **carbon sequestration industry** is **expanding** with continuous growth in the number of CCS-related projects started in 2017. The expansion is mainly driven by the recognition that **achieving net-zero greenhouse emissions** is increasingly **urgent**. CCS projects are primarily implemented in the **hard-to-abate industries** like cement, iron, steel, and chemical sectors.

Moreover, **CCS plays a crucial role** in **decarbonizing** power generation. **Decarbonization** of power generated by coal and gas **is highly important** as **renewable energy** sources will not be able to provide **grid-stabilizing services**. Thus, **CCS complements renewables**, helping make the low-carbon grid of the future resilient and reliable. We expect to see a **continuation of the expansion** occurring concurrently with the development of renewable energy sources.

**Ukraine** is deemed to have **vast potential** for the implementation of the CCS-related projects, due to heavy carbonization of the economy. In addition, Ukraine has **well-developed** iron and steel **industries** that are **hard-to-abate**. Moreover, Ukraine has **immense arrays** of abandoned and low-fertile **land** that can be used for **carbon removal** through the cultivation of trees and perennials.

Yet, there are **several obstacles** to realizing the untapped potential. There is currently an absence of systemic state support for these projects. Moreover, the coal and **gas power generation facilities** are technologically **outdated**, making the integration of **CCS technologies more complex**. Lastly, the **regulatory framework** is **not developed enough**, making the implementation of CCS projects harder.

# The Next 10



## 2.6.1. Next Generation Construction Materials

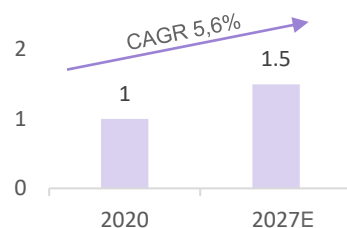


## 2.6. The Next 10

### 2.6.1. Next Generation Construction Materials: Global Trends

#### Construction materials

**Projected growth of the global construction materials market, 2020-2027, US\$ Trillion**



Source: ReportLinker "Global Construction Materials Industry Report", July 2020

#### TRENDS

##### 1 Sustainable and eco-friendly materials

Development and application of zero-waste, carbon-neutral, eco-friendly materials during production and construction. Application of safe materials that do not harm the environment.

##### 2 Resilient materials

Development and application of materials resistant to different severe conditions in terms of temperature, moisture, seismic activity, pollution, etc.

##### 3 Cost-effectiveness

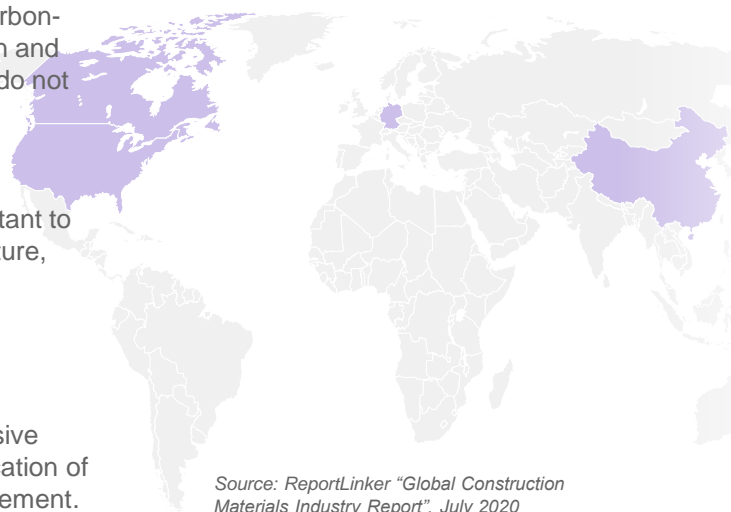
Application of cheaper and less resource-intensive materials in production and construction. Application of technologies that require less labor force involvement.



## Next Generation Construction Materials

Growth of the infrastructure and building industry will significantly influence the development of innovative construction materials. Next-generation materials will shape the future of construction, enabling innovative, sustainable, and cost-effective approach in the industry.

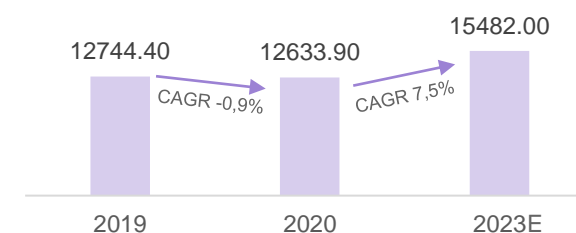
**The largest and the fastest growing construction materials markets in the world, 2020-2027**



Source: ReportLinker "Global Construction Materials Industry Report", July 2020

#### Construction market

**Global construction market value and projected growth, US\$ Billion**



Source: The Business Research Company, "Construction Global Market Opportunities and Strategies", July 2020

#### TRENDS

##### 4 Innovative solutions

Active development of the the newest construction materials like self-healing concrete, hardwood cross-laminated timber, bioplastic, homeostatic facades, artificial spider silk, aerographite, memory steel etc.

##### 5 Use of new technologies

Infusing of new technologies and innovations in the construction process: off-site construction, use of robotics, use of autonomous construction vehicles, application of AI, 3D printing, etc.

##### 6 Innovative designs

Upgraded existed materials and the newest innovative materials provide a possibility to construct new forms and designs.





## 2.6. The Next 10

### 2.6.1. Next Generation Construction Materials: Ukraine

#### Current state

- ▶ In January-September 2020, Ukrainian enterprises performed construction works worth UAH 119,781.4 million.
- ▶ New construction accounted for 38.1% of total production volume, capital and maintenance work – for 34.1%, reconstruction and technical re-equipment – for 27.8%.
- ▶ Total **exports** of basic industrial building materials amounted to **\$ 638 million**. Imports amounted to \$ 534 million, respectively.

#### Top-5 construction materials by production growth (in January-September '20 compared to the same period in '19, Ukraine)

<b>23.3%</b> increase	Planches, slabs, tiles and similar products made of cement, concrete or artificial stone
<b>22.2%</b> increase	Pebble, gravel, chip stone crumbs, and powder
<b>21.5%</b> increase	Granite
<b>14.5%</b> increase	Blocks and bricks made of cement, artificial stone or concrete for construction
<b>13.3%</b> increase	Gypsum



## In Ukraine Next generation construction materials Development plans

#### Market positioning

Overall, Ukraine has a large market of construction materials. Enablers such as close geographical location to Europe; facilities that may be useful for launching the R&D centers and laboratories; volume of raw materials that may be potentially interesting for construction; low labor and operating costs in comparison with European peers, etc. demonstrate the country's potential for attracting investments in the industry.

#### Possible steps from the Government

Promotion of Ukraine as a suitable destination for the development of the new-age construction materials based on the above enabling factors is required to attract investors in the industry.

#### Involvement of business, startups and academia

Cooperation between business and researchers may help to develop the newest and/or advanced construction solutions, boost local industrial capabilities and innovation potential to the next level, as well as attract investments in the industry.

#### Key drivers

#### Existing facilities and infrastructure

Ukrainian construction market has various facilities (factories producing construction materials) that can be potentially used for manufacturing the next generation materials.



#### Construction materials

Wide variety and significant volume of building materials available in Ukraine can serve as a solid basis for the production and development of innovative solutions in the construction industry.



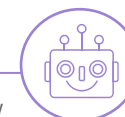
#### IT sources and labor force

Low labor costs in combination with a significant STEM-focused workforce and a variety of startups may be considered as an advantage by the investors.



#### Potential for R&D centers

Available facilities and conditions, like relatively low operating costs in comparison with the peer-countries, also make Ukraine a good destination for launching R&D centers and laboratories.



#### Convenient geographic location

Geographic location of Ukraine makes the country a good place with a convenient logistics network and access to European markets.



# The Next 10



## 2.6.2. High Energy Density Batteries

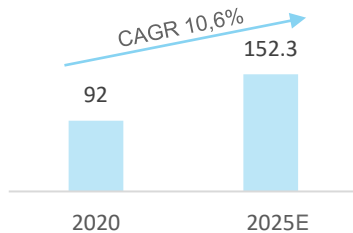


## 2.6. The Next 10

### 2.6.2. High Energy Density Batteries: Global Trends

#### Global market

Global battery market size and projected growth, 2020-2025, US\$ Billion



Source: ReportLinker "Battery Technology Market by Technology Type, Application and Region – Global Forecast to 2025", February 2020

#### TRENDS

##### 1 Electric vehicles development

Rapid development of the electric vehicles industry significantly affects the volume of the Lithium-ion batteries market.

##### 2 Application of batteries

Number of spheres where high density batteries may be applied, is growing fast and dynamically. Lithium batteries are currently the fastest growing type of batteries.

##### 3 Constant development of the high density batteries and their components

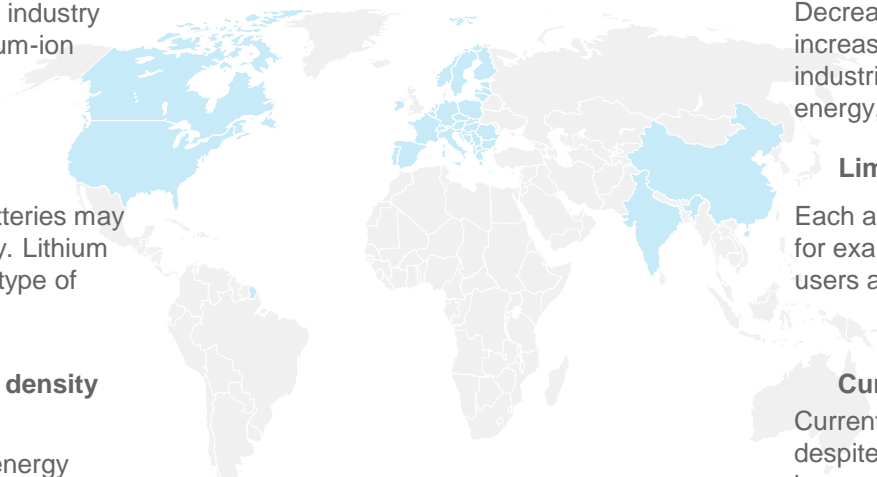
High demand for alternative resources of energy stimulates constant researches in the industry.



## High Energy Density Batteries

Since the development and usage of alternative sources of energy are gaining momentum globally, the high energy density batteries may become a long-lasting alternative source of energy for different types of electronics and electric vehicles.

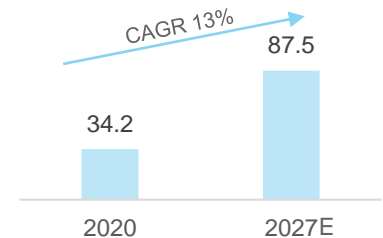
#### Key regions to hold the largest market share for battery technologies in 2020-2025



Source: ReportLinker "Battery Technology Market by Technology Type, Application and Region – Global Forecast to 2025", February 2020; EY Analysis

#### Lithium-ion battery

Global Lithium-ion battery market, 2020-2027, US\$ Billion



Source: Grand View Research "Lithium-ion Battery Market Size, Share & Trends Analysis Report, 2020-2027", July 2020

#### TRENDS

##### 4 Decreasing battery production costs

Decreasing battery production costs drive the increasing implementation of batteries in different industries (consumer batteries, IoT, automotive, energy, etc.).

##### 5 Limitations in available technologies

Each available type of battery has its own limitations, for example, connected with density, costs, safety for users and environment, etc.

##### 6 Current research of nuclear batteries

Current possible capabilities of nuclear batteries, despite their ability to work for a long time, are limited because of the small amount of energy production (low Wh/kg).



## 2.6. The Next 10

### 2.6.2. High Energy Density Batteries: Ukraine

#### Current state

- ▶ Dun&Bradstreet database contains a list of **84 battery manufacturing companies** registered in Ukraine\*
- ▶ The amount of lithium reserves in the country is a state secret, in accordance with the Ukrainian legislation. According to the Gosgeonadra's website information, in 2017-2018, special permits for lithium mining were obtained by Petro-Consulting LLC and Regional Investment Technologies LLC, but no mining was carried out as of March 2019. Gosgeonadra believes **that Ukraine has high prospects for creating its own lithium mineral resource base** and transforming it from an importing country into an exporter of lithium products.\*\*
- ▶ According to unofficial data provided in the media, lithium oxide resources in Ukraine reach **500 thousand tons**\*\*\*. However, information on the volume of lithium in Ukraine differs on different media resources.

Source: \*Dun&Bradstreet "Battery Manufacturing Companies In Ukraine" <https://www.dnb.com/>, accessed on December 12, 2020/

\*\*The State Service of Geology and Mineral Resources of Ukraine (Derzhheonadra), "Сировина для електрокарів: якими запасами кольорових металів володіє Україна?", March 2019;

\*\*\*"Економічна Правда", "Біла нафта": як Україна може заробити на "літієвій лихоманці", January 2018



## In Ukraine High Energy Density Batteries Development plans

#### Market positioning

Subject to thoughtful and structural market positioning and promotion of key enablers, Ukraine can attract investments in the high energy density batteries industry that is yet to be developed locally.

#### Possible steps from the Government

Promotion of Ukraine as a good destination for the development and production of high energy density batteries may be performed to attract investors in the industry. To perform this, it is necessary to analyze and assess available resources, current state and potential, as well as available expertise in the industry.

#### Involvement of business, startups and academia

In order to develop the industry, it is necessary to activate public-private partnerships. Cooperation between businesses and researchers may also help to develop innovative solutions for the high energy density batteries sphere and attract investments in the industry.

#### Key drivers

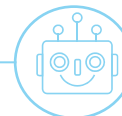
#### Labor force

Low labor costs in combination with a significant workforce with technical background, and the availability of startups that develop innovative solutions, may be considered as an advantage by the investors.



#### Strong potential for R&D centers

Available facilities and conditions, like relatively low operating costs in comparison with the peer countries, also make Ukraine a good destination for launching R&D centers and laboratories.



#### Disposal of nuclear waste

Subject to the development of reliable technologies for the production of batteries from nuclear waste, a plant for the production of such batteries may be built in the Chernobyl zone near the New Safe Confinement.



#### Geographical location

Geographic location of Ukraine makes the country a good place for business location and nearshoring.





# The Next 10



## 2.6.3. Healthcare Infrastructure

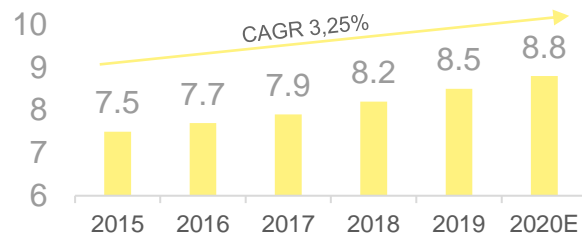


## 2.6. The Next 10

### 2.6.3. Healthcare Infrastructure: Global Trends

#### Healthcare

Global healthcare spending, 2015-2020, US\$ trillion



Source: Institute for Health Metrics and Evaluation, "Financing Global Health", April 2020

#### TRENDS

##### 1 Medical tourism

Medical tourism is on the rise, with millions of people traveling across the globe each year to get more affordable medical services.

##### 2 Digitalization

Technologies like AI, IoT, big data are expected to have a huge influence on the healthcare sector by bringing new tools and software to the industry.

##### 3 The empowered customer

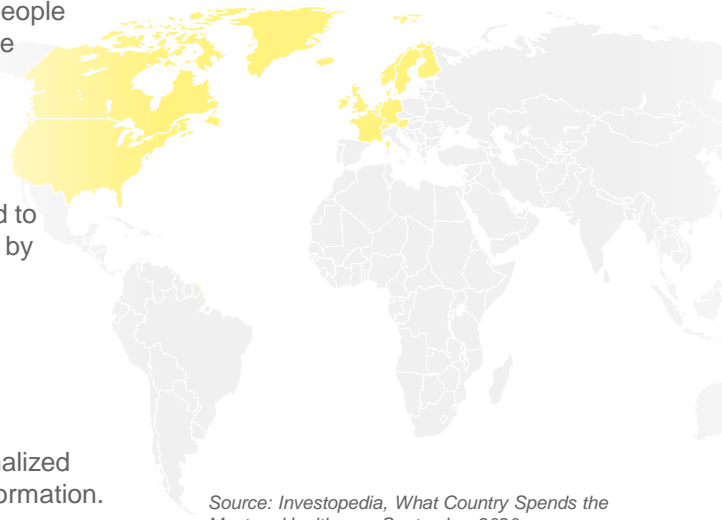
Patients are demanding more sophisticated, convenient, transparent, affordable, and personalized service due to the unprecedented access to information.



## Healthcare Infrastructure

The healthcare sector entails providing medical services to the world's population. The sector can be divided into private and public sub-segments.

#### Countries that spend the most on healthcare, 2020



Source: Investopedia, What Country Spends the Most on Healthcare, September 2020

#### Alarming demographics

**1 billion**

the expected increase in the world's population by 2025.



**300 million**

of that increase is predicted to come from those aged 65 or more.

Source: United Nations

#### TRENDS

##### 4 Chronic diseases are on the rise

Chronic diseases and conditions are on the rise worldwide. An aging population and changes in societal behavior are contributing to a steady increase in these common and costly long-term health problems.

##### Changes in demographics

Demographic shifts and societal changes are intensifying pressures on health systems. Aging populations in both emerging and developed nations are driving up the demand for healthcare.

##### 6 Depleting resources

As demand for healthcare increases, governments face growing pressure to reduce costs without impacting quality or access to care.



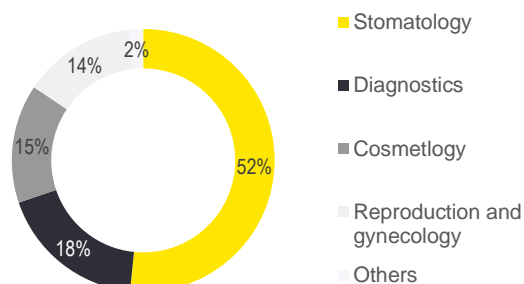
## 2.6. The Next 10

### 2.6.3. Healthcare Infrastructure: Ukraine

#### Current state

- ▶ The healthcare sector is currently undergoing structural reforms aimed towards modernization and digitalization of the industry.
- ▶ Medical tourism popularity is growing continuously in recent years, attracting people from Italy, Germany, France, and other countries.
- ▶ Ukraine offers a cost-competitive business environment with a strong knowledge base, especially in reproductive medicine, stomatology, and ophthalmology.
- ▶ Thus, Ukraine's healthcare sector has strong potential, especially in the field of medical tourism.

**Structure of private health services (monetary terms), %, 2016**



Source: Dutch Ministry of Foreign Affairs



#### In Ukraine

## Healthcare Infrastructure

### Development plans

#### Government

In 2018, the Ministry of Health (MoH) launched a series of reforms to modernize and improve medical services. Also, MoH is tightly cooperating with the EU to improve the healthcare industry. For example, the EU helped Ukraine to implement electronic health records.

#### Ukrainian Association of Medical Tourism

The association promotes the development of medical tourism by connecting local clinics, recreational centers with foreign tourists. Also, the association organizes different forums about medical tourism in Ukraine.

#### Institute of cell therapy

The institute is one of the most internationally recognized Ukrainian private clinics specializing in stem cell treatment. The institute attracts a large number of medical tourists each year, promoting Ukraine on the global medical tourism scene.

#### EU4Digital

EU4Digital is an initiative of the EU which supports digital reforms. Among other objectives, It helps Ukraine to make the healthcare sector more digital, improving the overall attractiveness of the sector in the eyes of foreign investors.

#### Key drivers

#### Large population

Ukraine has one of the largest populations across countries of the European Union (EU). Also, life expectancy is relatively low compared to the EU.



#### Public-private partnership (PPP)

Ukraine offers a way of market entry, which entails strong governmental support, substantially reducing risks associated with the investments.



#### Growth in popularity of private clinics

In recent years, there was rapid growth in the popularity of private clinics leading to the emergence of new market opportunities in the sub-sector.



#### Cost advantage

Ukrainian healthcare sector is characterized by relatively low operating costs compared to the EU, which can serve as a strong competitive edge in the international healthcare market.



#### Local expertise

Doctors in Ukraine are well-educated and able to provide services that have quality comparable to the ones in the EU.



# The Next 10



## 2.6.4. Hydrogen



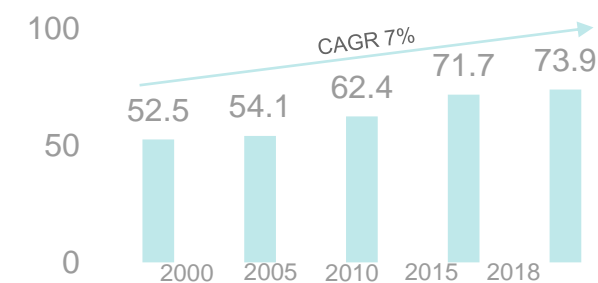


## 2.6. The Next 10

### 2.6.4. Hydrogen: Global Trends

#### Hydrogen market

##### Global hydrogen demand, 2000-2018, Megatons



Source: International Energy Association, Global demand for pure hydrogen, November 2019

#### TRENDS

##### 1 Global governmental support

In recent years, governments across the world were actively promoting the development of the hydrogen sector as a part of emissions reduction programs.

##### 2 Hydrogen versatility

Hydrogen can be used in a wide variety of cases like construction, power generation, transport, oil refining, and many more.

##### 3 Decarbonization trends

H<sub>2</sub> is highly important for the achievement outlined decarbonization plan as the only h<sub>2</sub> can reduce emissions in certain industries like heavy machinery.

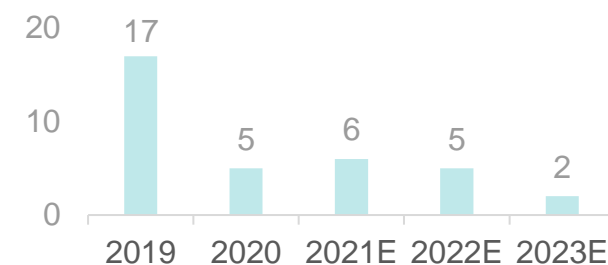


## Hydrogen

The hydrogen sector implies using hydrogen in various fields ranging from transportation to power generation. One of the key drivers behind the development of the hydrogen sector is global decarbonization.

#### Hydrogen projects

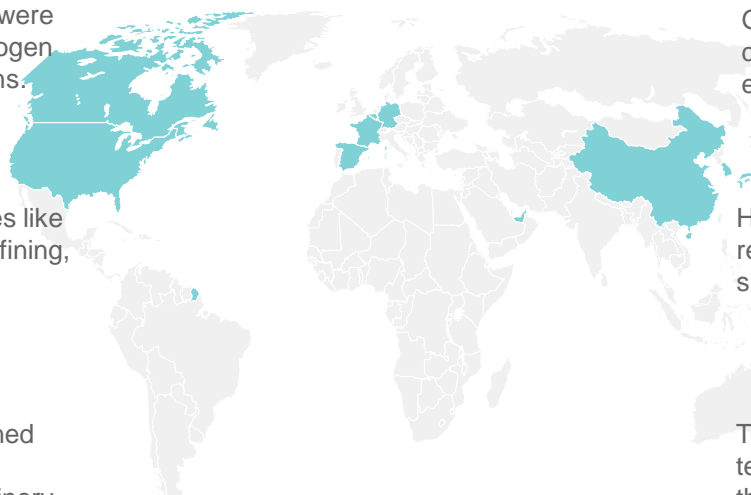
##### Number of power-to-hydrogen projects, 2019-2023



Source: International Renewable Energy Agency, "Hydrogen a renewable energy perspective", September 2019

#### TRENDS

##### Countries with the largest H<sub>2</sub> production capacities, 2017 (million cubic feet/day)



Source: HydrogenTools, "Refinery hydrogen production capacities by country", January 2017

##### 4 Growth of renewable energy

Global capacities of renewable energy are growing continuously, making the production of hydrogen less expensive.

##### 5 Increase in efficiency of renewable energy

Hydrogen can help with a variable output from renewables, like solar photovoltaics and wind, whose supply is not always matched with demand.

##### 6 Availability of technologies

There were several false starts that created a solid technological foundation that can be used to promote the development of the hydrogen sector.



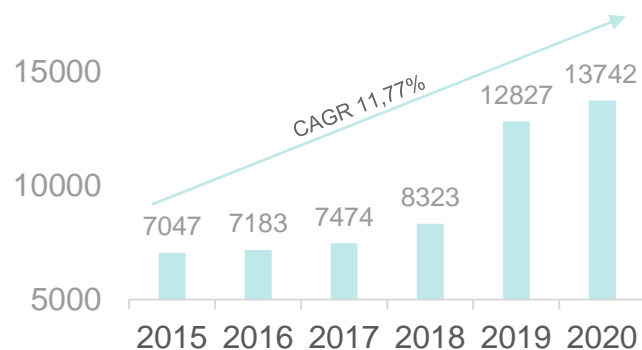
## 2.6. The Next 10

### 2.6.4. Hydrogen: Ukraine

#### Current state

- ▶ The hydrogen sector is in the stage of rapid development supported both by large energy companies, government, and international institutions.
- ▶ There were several pilot projects launched in 2019 and 2020. For example, in 2020 company called "H2" launched the construction of the first hydrogen production facility in Ukraine.
- ▶ Ukraine has a strong foundation for H<sub>2</sub>-related projects as the country has a continuously growing capacity of renewable energy, which crucial for H<sub>2</sub> development. It can be seen from the graph below.

**Renewable energy capacity of Ukraine, 2015-2020, Megawatt**



Source: State Agency of Energy Efficiency and Energy Saving of Ukraine

## In Ukraine

# Hydrogen

## Development plans

#### Government

Ministry of Energy (MoE) is planning to develop a strategy for hydrogen implementation. MoE met with Siemens and other German companies to discuss H<sub>2</sub>-related practices. Ukrainian and German governments signed an agreement on cooperation in the energy sector, including the development of H<sub>2</sub> industry.

#### DTEK

The company became the first Ukrainian member of the "Hydrogen Europe" association, which promotes the development of the hydrogen sector. The aim of the company's membership is to bring innovative H<sub>2</sub> practices to Ukraine.

#### Ukrainian Hydrogen Council

The council was established in order to include Ukraine in the global energy dialogue. Also, the council aims to attract investment in the hydrogen industry and facilitate entry of the international hydrogen projects.

#### Ukrainian National Academy of Sciences

The institution has been supporting research in the field of hydrogen since 2006. In 2019, for the first time, the institution allocated more than 3 million hryvnias to support the implementation of local hydrogen-related projects

#### Key drivers

#### Vast demand

There are numerous use cases of hydrogen in Ukraine. Moreover, large companies like DTEK, Naftogaz are highly interested in H<sub>2</sub>-related projects.

#### Structural support

The hydrogen segment is being supported by different governmental entities like MoE. Also, European institutions like Hydrogen Europe support H<sub>2</sub> initiatives in Ukraine.

#### Cooperation with European Union (EU)

EU has drafted memorandums that promote the development of H<sub>2</sub> initiatives. These memorandums view Ukraine as one of the key partners of the EU in the development of the H<sub>2</sub> sector.

#### Abundance of renewable energy

Ukraine has an extensive network of renewable energy sources that are crucial for H<sub>2</sub> production making H<sub>2</sub>-related projects highly attractive.

#### Geographical location

Geographical location of Ukraine is highly favorable as it provides relative proximity to almost all European markets.

# The Next 10



## 2.6.5. Connected Health

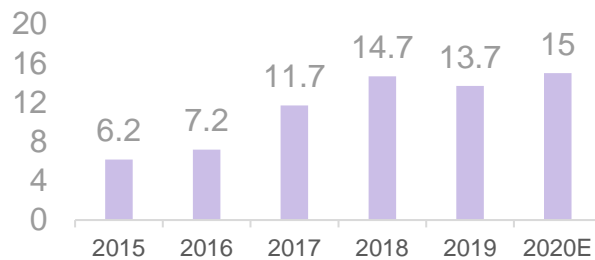


## 2.6. The Next 10

### 2.6.5. Connected Health: Global Trends

#### Industry startups

Global startup funding, 2014-2020E, \$US Billion



Source: StartUp Health, "2020 Midyear", August 2020; EY analysis

#### TRENDS

##### 1 Artificial intelligence

AI has numerous use cases in healthcare ranging from drug development to disease detection. Also, it is expected that AI can help in achieving substantial efficiency gains.

##### 2 Big data

Big data is a powerful tool in healthcare that can substantially improve the accuracy of disease identification. Big data can also be used to simplify the paperwork transforming it into a valuable source of statistical data.

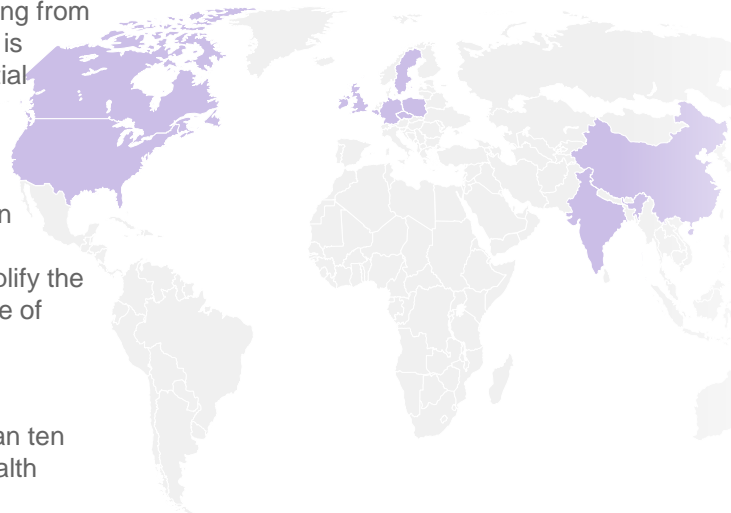
##### 3 Wearable devices

The sub-sector is expected to grow by more than ten times in the next decade due to the growing health concerns of the world population.

## Connected Health

Connected health industry entails various wearable devices ranging from fitness trackers to devices that track different vitals. Moreover, it covers AI, big data, and machine learning solutions as supportive instruments for the healthcare industry.

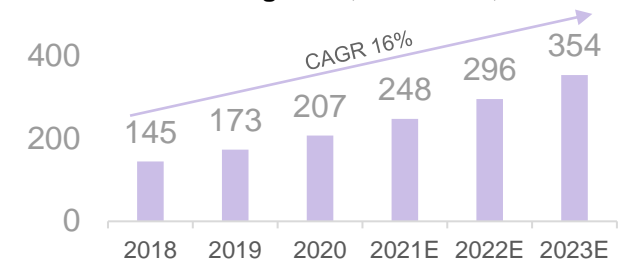
#### Countries with the most startup funding, 2020 (Number of deals)



Source: StartUp Health, "Midyear 2020", August 2020

#### Industry size

Connected health market size and expected growth, 2018-2023, \$US Billion



Source: Global Market Insights, "Digital health market", December 2019; EY analysis

#### TRENDS

##### 4 Telemedicine

Due to the current pandemic conditions, the sub-sector became pivotal and expected to grow rapidly with an estimated CAGR of 19% and reach \$113 billion in 2025.

##### 5 Virtual/Augmented realities

The sub-sector is highly useful in surgery, education, and emergency responses, making it one of the most critical enablers in healthcare technological advancement.

##### 6 World Population

World population is aging, which creates substantial pressure on the healthcare industry, creating a need for technological advancements.





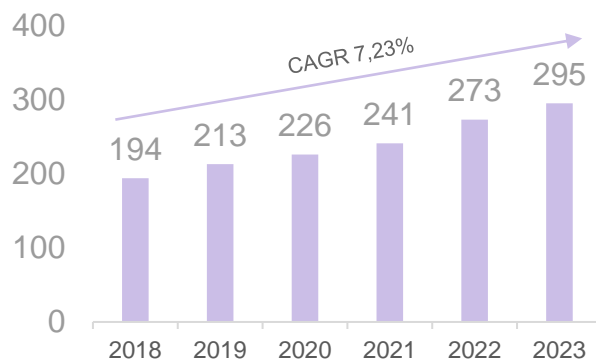
## 2.6. The Next 10

### 2.6.5. Connected Health: Ukraine

#### Current state

- ▶ The domestic connected health industry is primarily focused on creating services and products for the Western markets like the USA and the European Union (EU).
- ▶ The sub-segment of wearable devices is expanding most rapidly due to increased health concerns of the population.
- ▶ In 2018, Ukraine's government initiated a healthcare reform called "E-health" to digitalize the healthcare industry and promote the private healthcare sector's growth and innovation.

Ukrainian connected health market size (\$M)



Source: EY analysis



#### In Ukraine

## Connected health

### Promising companies

#### Esper Bionics

The company is focused on developing hand prostheses that are accompanied by the digital platform for training. The company already received funding from several venture funds and entities affiliated with the EU.

#### Cardiomo

The company is specializing in the development of wearable devices that monitor heart health in real-time. Devices allow the identification of various heart diseases in the early stages. The company has already gone through several funding rounds.

#### Mawi Solutions

The company develops wearable devices and cloud solutions that use artificial intelligence to detect diseases in their early stages. The company is mainly focused on providing b2b solutions for giants like AXA, GE, and Huawei.

#### Racoon.World

The company is focused on creating a digital platform and wearable devices that help people recover from neurological diseases. The company is actively operating in Ukraine and gradually expanding its presence to Western markets.

#### Key drivers

#### Skilled labor force

IT specialists are generally younger with broader experience as a majority of them are working in outsourcing. Moreover, Ukraine has one of the biggest numbers of technical graduates.



#### Cost-competitive labor

Cost of labor is cheapest across the EU, making Ukraine a great place to locate production facilities. For example, Comarch facilities in Poland can be deployed more efficiently and cheaply in Ukraine.



#### Strong potential for R&D centers

Cheap and skilled labor creates an excellent opportunity to establish R&D centers that will be cheaper and more effective than those located in the EU.



#### Vast network of startups

Numerous startups from different fields seek opportunities to expand, creating a unique source of innovation potential for foreign companies.



#### Governmental reforms

The governmental "E-health" initiative will create substantial market opportunities by increasing demand for connected health industry products.



# The Next 10



## 2.6.6. Port Automation and Innovative Waterborne Freight Transport

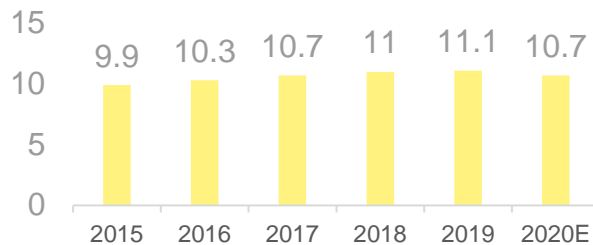


## 2.6. The Next 10

### 2.6.6. Port Automation and Innovative Waterborne Freight Transportation: Global Trends

#### Seaborn trade

Global seaborne trade volume, 2015-2020, billion tons



Source: EY analysis, UNCTAD

#### TRENDS

##### 1 ICT opportunities

Implementation of ICT in port automation and waterborne freight transportation allows to make operations more efficient and autonomous as well as partially resolve capacity problems.

##### 2 Growing population

Growing population leads to the increasing pressure on ports throughput and container ships' capacity pushing companies to look for solutions within the field of digital and green technologies

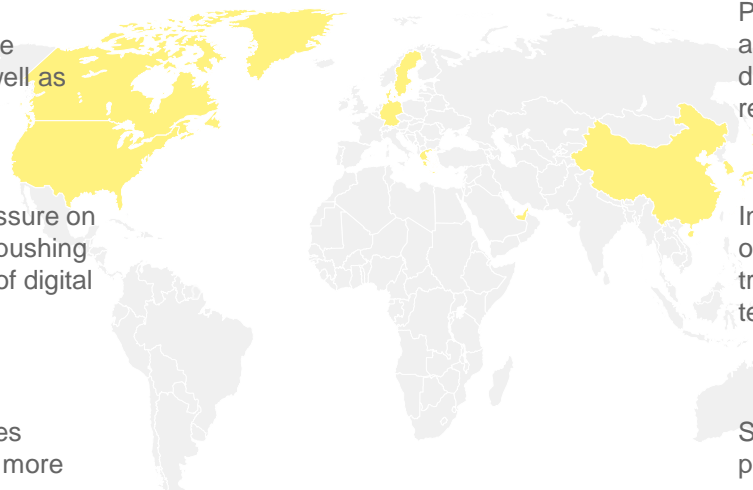
##### 3 Green energy

Rapid development of renewable energy sources creates an opportunity to make container ships more autonomous and energy-efficient.

#### Port Automation and Innovative Waterborne Freight Transport

The industry implies using ICT, green energy, and other modern solutions to redesign and innovate waterborne freight transportation. Similarly, port automation means using ICT, IoT, and other digital solutions to make ports more autonomous.

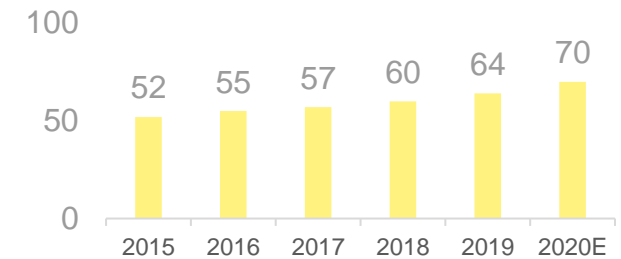
#### Countries with the most advanced maritime technologies, 2019



Source: Menon, "The leading maritime capitals of the world", 2019

#### Automated ports

Global number of ports with automated terminals, 2015-2020



Source: EY analysis, Port Economics, Management and Policy, "Cumulative Number of Automated Terminal and Automated Surface", December 2018

#### TRENDS

##### 4 Regulatory pressure

Ports face severe regulatory pressures in the face of allowed emissions making optimization through digital technologies the only way to comply with the regulations given the increasing level of throughput.

##### 5 Need for integration

Increasing trade volumes create substantial pressure on managing the logistics side of freight transportation, increasing the need for the technologies like IoT and big data.

##### 6 Increasing size of container ships

Size of container ships continuously increases, pushing ports to use digital technologies to become more autonomous to sustain the required throughput.



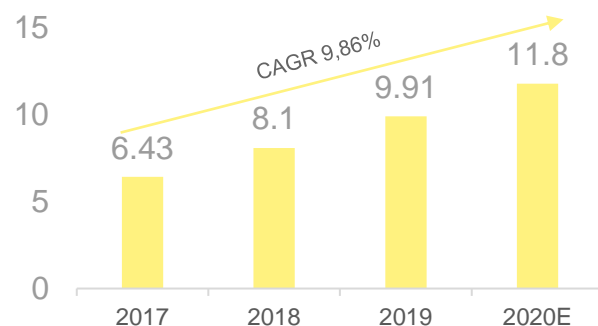
## 2.6. The Next 10

### 2.6.6. Port Automation and Innovative Waterborne Freight Transportation: Ukraine

#### Current state

- ▶ Over the past few years, inland water freight transportation had been growing continuously from 6.4 million tons in 2016 to 11.8 million tons in 2019.
- ▶ On average, 49% of all waterborne freight are products from the agricultural and metallurgic industries.
- ▶ Ports are also experiencing stable growth in cargo handling in recent years.
- ▶ Yet, industries are technologically outdated, which creates an opportunity for foreign investors to test their technologies and fulfill the emerging market gap.

#### Inland waterborne freight transportation, million tons



Source: GMK Center, April 2020

#### Key drivers

### In Ukraine

## Port Automation and Innovative Waterborne Freight Transport Development plans

#### Government

Ukraine is planning to create a platform similar to European CESNA in order to facilitate talks between domestic companies, investors, and the government. Also, the government is planning to increase cooperation with the EU in the field of inland water transportation to promote the development of the industry.

#### QTerminals

In September 2020, Qterminals became a concessioner of the "Olvia" port. It is expected that the company will invest around €3.4 billion in the port's infrastructure that will serve as one of the steps in bringing modern maritime technologies to Ukraine.

#### UKRRICHFLOT

The company is planning to begin the construction of five new barges in 2021. Yet, the company is expecting financial constraints creating a strong opportunity for the foreign investors to engage in a partnership and test new technologies.

#### Dunaisudoservic

The company is specializing in shipbuilding and repair. In 2020, the company built the largest Ukrainian barge showing the remarkable potential of Ukrainian shipbuilding infrastructure.

#### Inland water transportation law

The law is aiming to recover inland water transportation by updating industry standards that will facilitate establishing test grounds for the various innovative projects.

#### Shipbuilding and ship repair facilities

Ukraine has numerous unutilized locations that can be used as manufacturing and repair facilities for various projects. Operating costs are expected to be substantially lower compared to European peers.

#### Concession laws

Concession laws create an opportunity to acquire port facilities with numerous terminals. These ports can serve as testing grounds for the projects covering port automation.

#### Interest of large domestic companies

Major players from metallurgy and agriculture are interested in inland water transportation but reluctant to engage due to the outdated infrastructure. Thus, there is a market opportunity for foreign investors.

#### Ukrainian river network

Ukraine has a vast river network creating an opportunity to create a flexible logistics network with access to European markets.



# The Next 10



## 2.6.7. EV Charging Stations Infrastructure



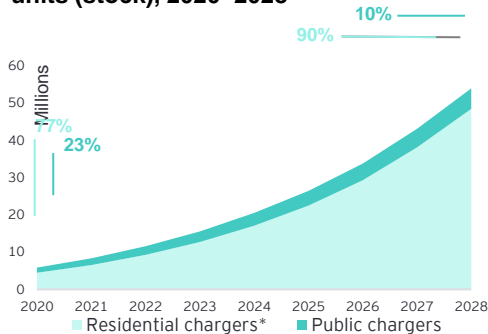


## 2.6. The Next 10

### 2.6.7. EV Charging Stations Infrastructure: Global Trends

#### Charging units

##### Residential and public EV charging units (stock), 2020–2028



Source: "Electric Vehicle Charging Infrastructure: Market Forecast (2019–2028)," Northeast Group, LLC, March 2019. Note: \*Only includes Level 2 chargers

#### TRENDS

##### Diversity of places to charge the EV

Significant number of charging units globally will be residential ones. At the same time, the number of public chargers will also grow. There is a possibility for a wide array of places to charge: workplace charging, intracity charging stations, curbside charging, destination charging, etc.

##### Rapid growth of the global EV parc

Rapid growth of the global passenger fleet is caused by a number of factors, including sustainability trends, declining battery costs, etc.

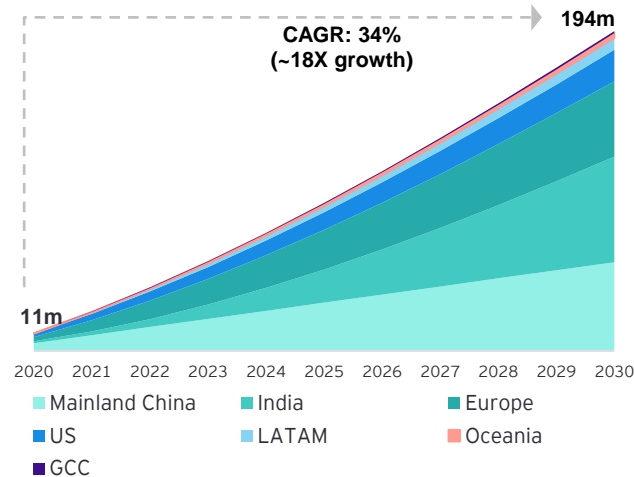
##### Sustainable solutions and other enablers

Global sustainability agenda, development of faster charging solutions, and other factors significantly drive the increase of the EV market.

## EV Charging Stations Infrastructure

Rapid projected growth of the global passenger EV parc affects the necessity to deploy the broader public charging infrastructure. This, in turn, requires significant investments in the infrastructure to support such growth.

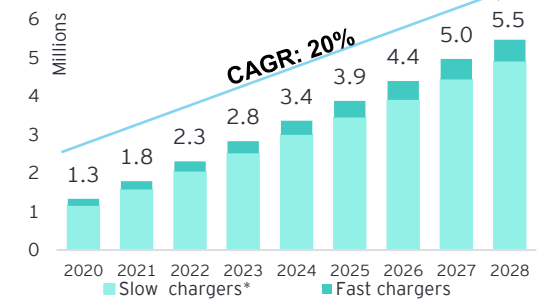
##### Global passenger EV parc (millions), 2020–2030



Source: EY CDC analysis

#### Charging units

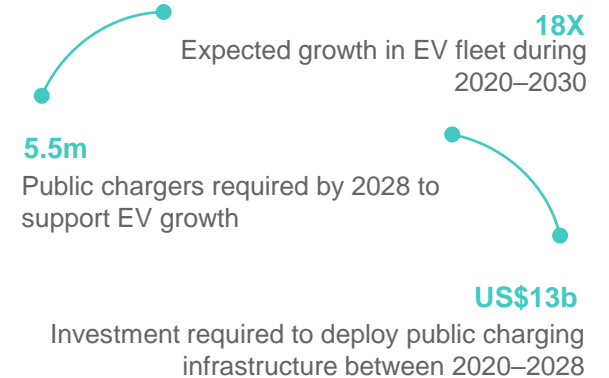
##### Public slow- and fast-charging units (stock), 2020–2028



Source: "Electric Vehicle Charging Infrastructure: Market Forecast (2019–2028)," Northeast Group, LLC, March 2019. Note: \*Only includes Level 2 chargers

#### TRENDS

##### REQUIRED INVESTMENTS



Source: Northeast Group, LLC



## 2.6. The Next 10

### 2.6.7. EV Charging Stations Infrastructure: Ukraine

#### Current state

2 719

Public charging stations (standard and fast charging)\*. Of these, there are:

5 902

Charging units (on average 2,17 units per 1 station)\*

\*As of January 2020

Source: [www.autogeek.com.ua](http://www.autogeek.com.ua)

> 20 000

Overall number of EV registered in Ukraine\*\*

1 700

EV registered in Ukraine in the first quarter of 2020. This is one third more than in the same period in 2019

\*\*As of first half of 2020

Source: Ukrainian Motor Vehicle Manufacturers Association, <https://ukrautoprom.com.ua/>

#### Projected growth

18 100

Public charging stations in 2024

Source: e-Experts Survey from IRC Group.

Information placed on the Employers' Federation of Automotive Industry, <https://fra.org.ua/>

50 000

EV cars by 2025 in Ukraine

Source: [UkraineInvest](http://UkraineInvest)

## In Ukraine EV Charging Stations infrastructure Development plans

#### Brief overview

Overall, the EV charging infrastructure in Ukraine is growing. The local electric car market has shown significant growth in recent years.

In order to boost the EV growth in Ukraine, it is necessary to deploy a wider infrastructure of public charging stations that should be available across all regions and key routes.

#### Private sector

Market players like DTEK's YASNO e-mobility, OKKO, and others are deploying the EV charging stations in Ukraine.

IFC supporting Galnaftogas (operating under the "OKKO" brand) to modernize its infrastructure, including promotion of electric vehicle uptake by investing in fast-charging stations.

#### Government and IFI support

The World Bank is initiating a comprehensive study of the development of electric public transport infrastructure in Ukraine. The project is to be implemented at the end of June 2021 and will be coordinated by the Directorate of Digital Infrastructure in Transport and the Reform Support Team of the Ministry of Infrastructure of Ukraine.

#### Key drivers

#### Legislative incentives

Import duty exemption facilitates the growth of the local electric cars market.

#### Affordable cost for electricity

Affordable cost for electricity, especially due to the night tariff, stimulates EV market development in Ukraine.

#### Increasing number of EV manufacturers globally

Wide array of brands producing the EV influences the consumers' choice.

#### Sustainability agenda

Global sustainable agenda and trends for reducing the emission of pollutants affect stakeholders' actions to introduce broader EV infrastructure.

# The Next 10



## 2.6.8. Smart Waste Management

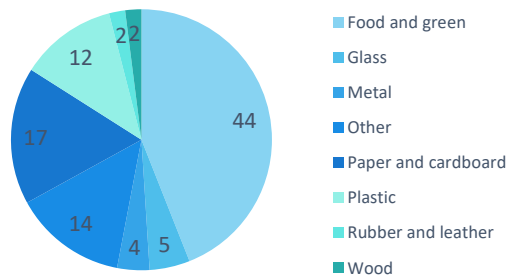


## 2.6. The Next 10

### 2.6.8. Smart Waste Management: Global Trends

#### Global waste

##### Global waste composition (percent)



Source: World Bank

#### TRENDS

##### 1 Waste volume is expected to grow

According to the World Bank, the volume of global waste is expected to grow to 3.40 billion tons by 2050. This requires new solutions and a sustainable waste management approach.

##### 2 Circular economy

Development of the circular economy approach that aims to use waste streams as a source of secondary resources, enabling reuse and recycling.

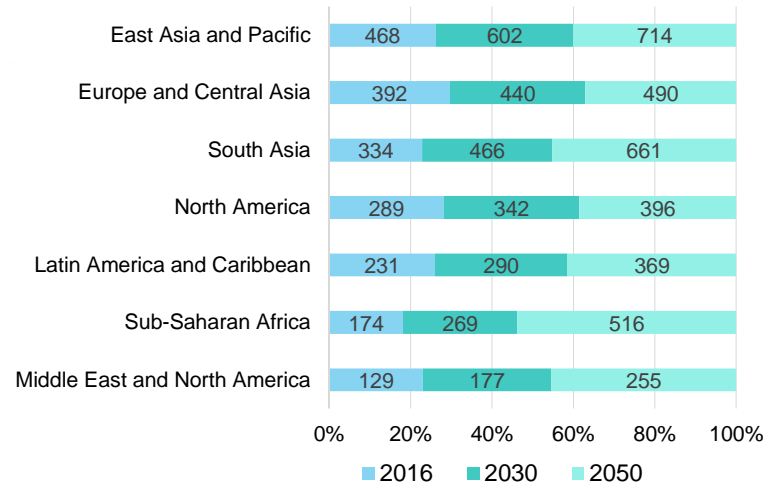
##### 3 Ban of plastic bags

Trend on natural and reusable packaging and wrapping instead of plastic bags in order to reduce excess and harmful waste.

## Smart Waste Management

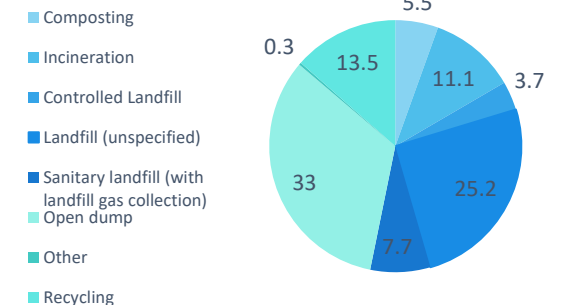
Smart waste management is a necessity for modern cities that are facing challenges related to the rising amount of waste and are searching for more sustainable and cost-efficient solutions. Modern technologies are among the key enablers that help stakeholders to boost operational efficiency, influence waste reduction, and apply sustainable solutions.

##### Projected waste generation, by region (millions of tons/year)



#### Waste disposal

##### Global treatment and disposal of waste (percent)



Source: World Bank

#### TRENDS

##### Application of new technologies

Active development of the new technologies connected with the whole waste management lifecycle, like prevention of excess waste, waste sorting, storage, processing, and disposal processes.

Among the variety of solutions, there are:

data management - using of data tools for monitoring and planning; radiofrequency identification that log and help to track the weight of the disposed waste; solar-powered waste compaction bins; touchless automatic bins and sorting; use of artificial intelligence; use IoT for providing intelligence to trashcans to prevent overflowing, and optimize routes to reduce traffic congestion, maintenance costs, and carbon footprint, etc.





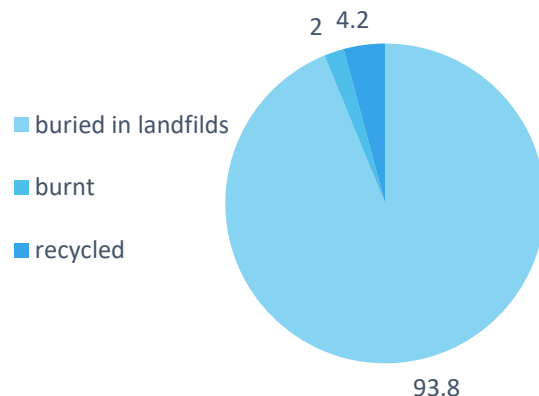
## 2.6. The Next 10

### 2.6.8. Smart Waste Management: Ukraine

#### Current state

- ▶ Waste generation in Ukraine averages **250-300 kilograms** per person per year, and this number tends to increase.\*
- ▶ There are no regulations in Ukraine that oblige to sort household waste. At the same time, there are cases of introduction of sorting at the local level. In addition, a number of private recycling stations have been introduced in recent years.
- ▶ In 2018, **9 million tons** of waste was generated in Ukraine. It was buried in 6,000 official landfills. 180 thousand wastes (2%) were burnt, and 378 thousand (4.2%) were sent to recycling points and waste processing plants.\*\*

**Ways of waste processing in 2018, Ukraine (percent)\*\***



## In Ukraine Smart waste management

### Development plans

#### Brief overview

The problem of proper waste management in Ukraine is significant. Resource-intensive multi-waste industrial production, absence of necessary infrastructure for effective waste management, the minimum percentage of the total amount of waste that is recycled, and other existing problems need urgent attention and solutions.

Ukraine needs investments in modern infrastructure and up-to-date methods of household and industrial waste management.

In 2017 the "National Waste Management Strategy in Ukraine until 2030" was approved. As of December 2020, The Law "On restricting the circulation of plastic bags" has been finalized and is ready for consideration in the second reading.

#### Participation of civil society

Researchers (startup teams), civil society, and environmental activists contribute to the development of smart waste management in Ukraine.

For example, there is a nonprofit project Recycle Map - a site where waste collection points for processing in Ukraine are marked. Another example: Public sorting station "No Waste Recycling Station," which is also an educational and advocacy platform that promotes systemic change at the state level.

#### Key drivers

#### Development of related legislation

Urgent necessity in the adoption of the world's best practices and standards stimulates the development of legislation that regulates smart waste management.

#### Sustainability agenda

Global sustainability trends and the necessity to introduce an effective and eco-friendly waste management approach in the country stimulate the local waste management agenda.

#### Opportunities for R&D developments

Solid IT infrastructure, comparatively low labor costs, and specifics of the geographical location make the country a good place for the establishment of R&D centers for the development of smart waste management solutions.

#### Opportunities for recycling plants construction

Such factors as a significant number of the skilled labor force, comparatively low labor costs, specifics of geographical location, and necessity in building critical waste management facilities also makes the country attractive in terms of investments in the recycling plants construction.

# The Next 10



## 2.6.9. Plant-Based Meat

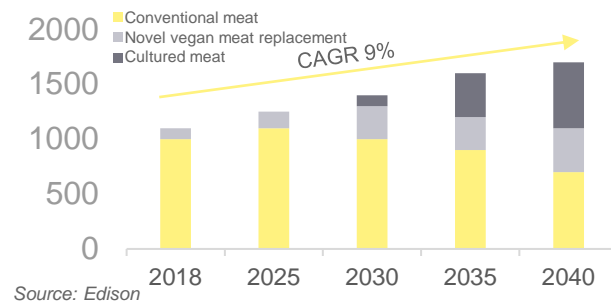


## 2.6. The Next 10

### 2.6.9. Plant-Based Meat: Global Trends

#### Meat market

Meat market size and expected growth, 2018-2023, \$US million



#### TRENDS

##### 1 Growing population

By 2050, the world's population will exceed 9 billion, and the appetite for meat will grow along with it. Yet, there are not enough world resources to fulfill that demand.

##### 2 Mitigating climate change

Cattle breeding industry is among the leaders of carbon dioxide emissions. Switching to meat alternatives will lower the effect on the environment.

##### 3 Consolidation of the market

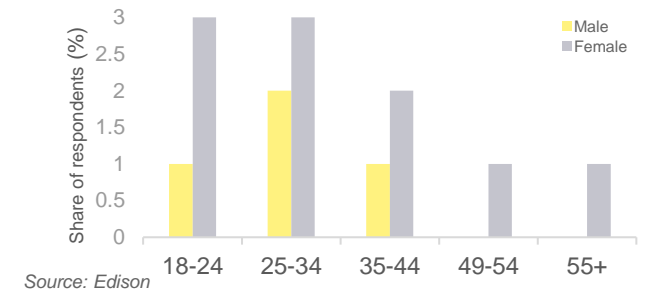
Large FMCG companies have already performed M&A activity in plant-based meat sector. Further investments are expected.

## Plant-based Meat

The plant-based meat industry implies the production of direct meat substitutes made of natural ingredients like rice, soya, and many more.

#### Vegan diet

Percentage of polled people following a vegan diet



#### TRENDS

##### 4 Health

Growing popularity of the healthy lifestyle leads to lowering of meat consumption and switching to healthier protein sources, which now includes also plant-based meat.

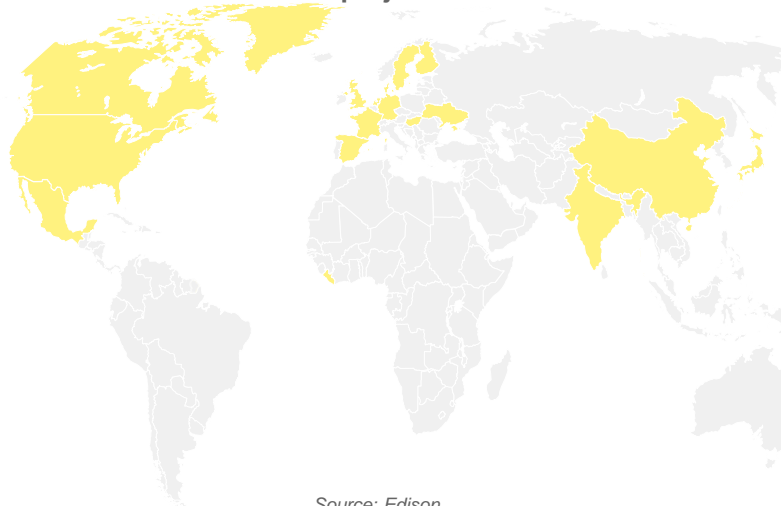
##### 5 Cell-based meat industry is still nascent

The major factor hindering the development of the segment is the price (around USD 10 per burger). However, it significantly decreased over the last couple of years. Commercial projects are not spread around the world yet.

##### 6 Rising prices for meat in the future

The technical possibilities to grow meat production rates starts to slow down, forcing people to switch to other sources of protein.

#### Countries with known meat alternatives projects





## 2.6. The Next 10

### 2.6.9. Plant-Based Meat: Ukraine

#### Current state

- ▶ Currently, there are no cultured meat projects in Ukraine.
- ▶ Plant-based meat is not covered by specific national food safety regulations. It is referred to as a semi-finished food product.
- ▶ There is only one large player present on the market - Beyond Meat. Its products are distributed through restaurant chains, healthy food shops, and retail chains (Metro, Silpo).
- ▶ Product line of plant-based meat is limited to burgers (Beyond Meat, Moving Mountains), sausages (Beyond Meat), and minced meat (Beyond Meat, Eat-me-at).
- ▶ Ukraine cultivates all the common components of existing plant-based meat recipes, except for coconut oil and coconut butter.

#### Plant-based meat

##### What is inside?



## In Ukraine Plant-based meat

### Key players

#### Beyond Meat

One of the most widely known plant-based meat producers in the world. In Ukraine, its products are distributed through the official distributor West Mills.

#### Moving Mountains

The company from Great Britain was founded in 2016. Metro Cash&Carry Ukraine started to sell the company's products within its own import line in December 2019.

#### Eat-me-at

Eat-me-at is a startup project founded by private entrepreneur Andriy Cherukha. The company produces minced plant-based meat and distributes it through its internet shop.

#### Relidium Biotech

It is a young full-cycle biotechnology company from Kharkiv oblast. The company has started the production of sunflower protein burgers and paste.

#### Key drivers

#### Interest of large agricultural companies

Relidium Biotech was one of the winners of the MHP Innovation Labs and received financial support from one of the leaders of the Ukrainian agricultural sector. This opens new opportunities for other startups in the sector.

#### Protein containing oil extraction wastes

History of Relidium Biotech in the plant-based meat industry started from the project on utilization of the sunflower oilcake through the production of the protein isolate. The technology may be replicated on other types of oil extraction wastes.

#### Product adaptation by restaurants

West Mills started distributing Beyond Meat products through the chain of its own restaurants. As of now, Plant-based meat products are available in more than 300 restaurants all over Ukraine.

#### Healthy food enthusiasm

History of Beyond Meat and Eat-me-at has started from the healthy food enthusiasm of owners of the West Mills and Etnodim, respectively. Plant-based meat products are actively distributed by healthy food and vegetarian food retail chains (Eko-Lavka, Eko-svit, Maosfood, and Vegetus).



# The Next 10



## 2.6.10. Carbon Sequestration

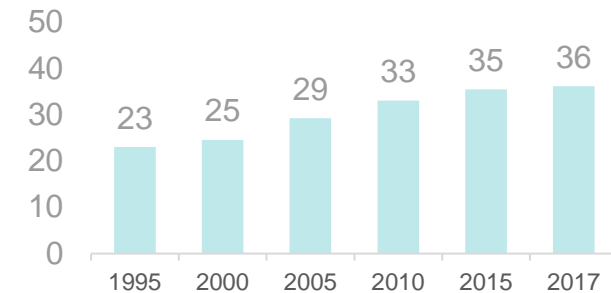


## 2.6. The Next 10

### 2.6.10. Carbon Sequestration: Global Trends

#### Carbon oxide emissions

Global carbon oxide emission, Gigatons



Source: Staista

#### TRENDS

#### 1 Nature of the process

Carbon sequestration occurs naturally and due to anthropogenic activities. Natural sequestration can be enhanced via changes in land use and forestry and also through geoen지니어ing techniques.

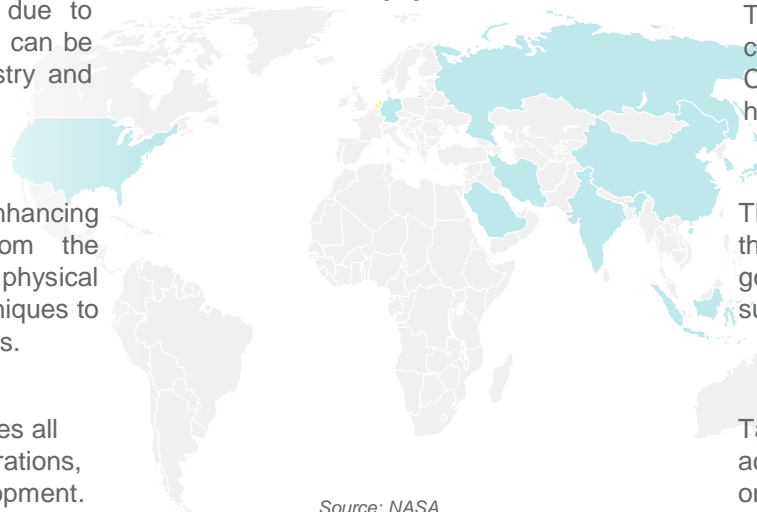
#### 2 Technology

Artificial sequestration techniques aimed at enhancing natural processes of carbon capture from the atmosphere through biological, chemical, or physical processes range from organic agriculture techniques to complex multilevel industrial filters and pipelines.

#### 3 Commercial projects

There are 26 operating commercial CCS facilities all over the world. 2 projects have suspended operations, and 34 projects are in different stages of development.

#### Top 10 countries with largest CO2 emissions, 2018

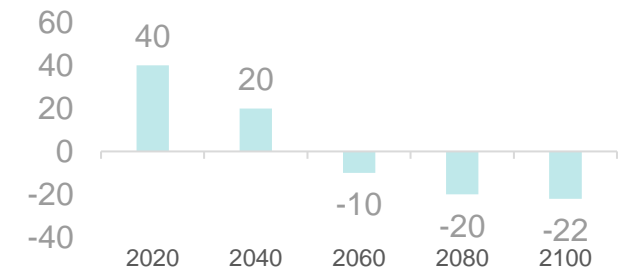


## Carbon Sequestration

Carbon sequestration of carbon dioxide removal (CDR) is the long-term removal, capture, and storage of carbon in plants, soils, geologic formations, and the ocean. Carbon sequestration occurs both naturally and as a result of anthropogenic activities.

#### Carbon sequestration usage

Projected CO2 emission if usage of carbon sequestration is maxed, 2020-2100, Gigatons



Source: CCS Global

#### TRENDS

#### 4 Financial costs

The use of CCS technologies would add from 1 to 18 cents per kWh of generated electricity that make CCS less profitable than RE generating solutions hindering CCS development.

#### 5 One Trillion Tree Initiative

The 2020 WEF in Davos announced the creation of the One Trillion Tree initiative platform for governments, businesses, and civil society to support the UN Decade on Ecosystem Restoration.

#### 6 Governmental regulations

Tax credits and federal financing of the CCS activities made the US a leader in the number of ongoing and developing commercial CCS projects.



## 2.6. The Next 10

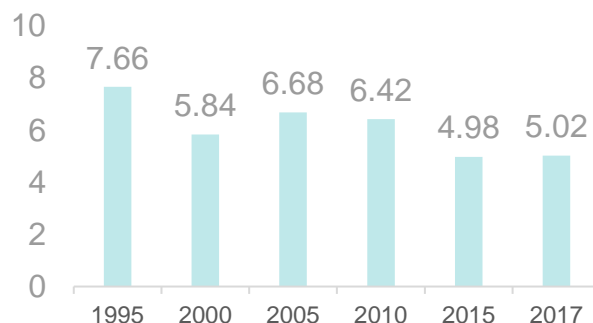
### 2.6.10. Carbon Sequestration: Ukraine

#### Current state

Ukraine has high potential in the implementation of both CCS induced and enhanced natural carbon sequestration.

- ▶ Coal has been exploited for many years in Ukraine. The existence of a well-established coal industry, technical expertise, and investments are the factors that may boost CCS efforts in the country. Unfortunately, the current priorities of the industry are increasing efficiency and reduction of emissions but not CCS.
- ▶ The country has wide opportunities for land management CCS projects. The most promising segment is engagement of abandoned and low fertility lands into the process of carbon removal through the cultivation of trees and perennials.

#### Carbon dioxide emission in Ukraine (metric tonnes)



## In Ukraine Carbon sequestration Active players

#### International organizations

GEF and UNDP are actively propagating environmental initiatives in general and carbon sequestration in particular through their joint project Development and Commercialization of Bioenergy Technologies in the Municipal Sector of Ukraine.

#### Government

In cooperation with international experts and organizations, authorities of Ukraine adopted a number of legislative documents regulating carbon sequestration activities, including Energy Strategy and the Strategy of Low-Carbon Development.

#### Large industrial companies

DTEK holding actively participates in low-carbon initiatives for more than ten years. The company held a number of public events in the field and is a leader in the adoption of green energy technologies.

#### Industry startups

There are at least two CCS startups in Ukraine. Those are Carbominer and Carbon-Ukraine Ltd. The latter has a representative in the US MedTech Diamond LLC.

#### Key drivers

#### Abandoned lands

The country has around 15.5 million ha (the EU estimates) of marginal (low fertility) lands that are not involved in agricultural production. Those lands may be used for afforestation and other land management CDR techniques.

#### Industrial emissions

Energy sector and manufacturing are responsible for 70.5% of carbon dioxide emissions. Mainly because of the absence of gas-purifying equipment.

#### Storage facilities

Ukraine has a lot of abandoned mines and karst cavities, which are considered as potential storage facilities for different types of carbon-capturing substances.

#### Organic production movement

Organic farming is one of the natural carbon sequestration techniques. The industry is actively developing in the country, involving more and more large scale producers.

#### Decline in cattle breeding sector

Cattle breeding is one of the main sources of carbon dioxide and methane emissions in agriculture. In addition, poor cattle grazing leads to a significant reduction in carbon absorption by grasses and soils.

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ED None.

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