

National Strategy to Increase Foreign Direct Investment in Ukraine

Section 2.4: Advanced Manufacturing

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Disclaimer



Key terms and abbreviations (1/3)

Names

GE General Electric

Periods

JanXX 31 January 20XX

XXQ1 First quarter of XX

Organizations

ACEA European Automobile Manufacturers' Association

APTA American Public Transportation Association

CES Centre for Economic Strategy

CIS Commonwealth of Independent States

CTS Centre for transport strategies

EBA European Business Association

EBRD European Bank for Reconstruction and Development

EU European Union

IEEE Institute of Electrical and Electronics Engineers

ITC The International Trade Centre

NBU National Bank of Ukraine

OICA International Organization of Motor Vehicle Manufacturers

QS Quacquarelli Symonds

SFSU State Fiscal Service of Ukraine

USPA Ukrainian Sea Ports Authority

Car plants

KrAZ Kremenchuk Automobile Plant

KrASZ Kremenchuk Automobile Assembling Plant

LAZ Lviv Bus Factory

LuAZ Lutsk Avtomobile Factory

OASZ Odesa Automobile Assembling Plant

ZAZ Zaporizhzhia Automobile Building Plant

Units

b billion

EUR Euro

ha hectares

km kilometer

kVa Kilo-volt-ampere

m million

mm millimeter

mW megawatt

Q quarter

Q-ty quantity

t tonne

ths thousand

UAH Ukrainian hryvnia

USD United States dollar

V Volt



Key terms and abbreviations (2/3)

Other		HS	Harmonized system
ACAA	Agreement on Conformity Assessment and Acceptance of Industrial Products	HVAC	Heating, Ventilation, Air Conditioning and Commercial Refrigeration
AGV	Automated Guided Vehicles	GDP	Gross domestic product
AMR	Autonomous mobile robots	IDS	International Dental Show
BEV	Battery electric vehicle	IEDM	International Electron Devices Meeting
ca.	circa, approximately	incl.	including
CapEx	Capital expenditures	JSC	joint stock company
CAGR	compound annual growth rate	KVED	Ukrainian classification of economic activities
CEE	Central and Eastern Europe	LED	Light-emitting diode
CEO	Chief executive officer	MMIE	Mechanical Manufacturing and Industrial Engineering
COVID	Coronavirus disease	N	number
CSP	commercial sea port	NACE	Statistical Classification of Economic Activities in the European Community
CVF	Commercial Vehicle Forum	n.e.s.	not elsewhere specified
Dr.	doctor	PhD	Doctor of Philosophy
e.g.	exempli gratia, for example	PHEV	plug-in hybrid electric vehicle
EBITDA	earnings before interest, taxes, depreciation and amortization	PPE	personal protective equipment
EECA	Emerging Europe and Central Asia	PPP	public-private partnership
excl.	excluding	R&D	Research and development
EMIS	Emerging Markets Information Service	RF	radio frequency
EV	electric vehicle	ROV	Remotely Operated Vehicles
FDI	foreign direct investments	SPV	Special Purpose Vehicle
FTA	free trade agreement	SUV	Sport Utility Vehicle



Key terms and abbreviations (3/3)

SE	state enterprise
SOE	state-owned enterprise
TV	television
UK	United Kingdom
USSR	Ukrainian Soviet Socialist Republic
US, U.S., USA	United States of America
Ukrstat, SSSU	State Statistics Service of Ukraine
vs	Versus
y-o-y	Year over year

Section 2.4

Advanced Manufacturing





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Executive Summary

Executive Summary: Introduction

One of the key strategic goals laid out in the Vision for this Strategy is Ukraine turning into a high value added economy - one based on modern infrastructure, new intellectual property, and new generation production approaches. This is a sector-agnostic goal, at least to a large extent. However, at its best, this transformation may be manifested by Advanced Manufacturing - an umbrella industry comprised of several sectors (Electronics, Engineering, and Automotive) and a myriad of sub-sectors.

Typically, it is within that industry that the bulk of the new intellectual property is being developed. That industry also defines and drives the most profound transformations of the economy by activating maximum scientific potential, small and medium business involvement, construction, upgrade of education quality and focus – and generally becomes a source of some of the highest economic value for every invested dollar.

Global technological pace accelerated the development of the industry across the board, adding hundreds of billions to the stock values of the corporate leaders in the sector. The importance and effect of the current megatrends repeatedly mentioned across this Strategy in various sectors is ostensibly the most dramatic for the Advanced Manufacturing group. Forced build-up of supply chain resilience, sustainability, and digitalization are transforming the industry at a pace never experienced before.

Supply chain resilience, for one, has been of utmost importance to the short- and long-term business development and risk mitigation considerations of the international players in the industry, given COVID-induced “stress tests” of the international supply chains and the as-yet-unfinished major trade dispute between USA and China.

Global dependence on ever-growing Chinese production capacities by the majority of the largest MNCs in Advanced Manufacturing – both for finished products and parts/components – lulled the said MNCs into a false sense of security, which was summarily thrashed when COVID force-stopped first China, leading to multi-month supply chain delays across the globe, and then the economies of the USA and Europe, which had a dual effect of stressing logistics infrastructure (ports, cargo management hubs et al.) to its limits and providing incredible downward pressure on disposable income and hence, demand for key AM sectors – Automotive and Consumer Electronics.

The world is adapting now; however, that ‘stress test’ pushed the MNCs to begin considering the so-called “China+1” or “2nd China” options to stabilize their supply chains and make them more resilient. The approach being considered is to set up ‘reserve’ manufacturing sites out of China to back-up their primary Chinese capacities. Someone’s loss is more often than not someone else’s gain – the emerging economies closer to European borders are in prime position to make use of the trend and offer their best to be the recipients of the ‘reserve production’ location decisions.

Analysis of the latest public earnings calls by global leaders of the Advanced Manufacturing performed by EY’s Global AM team in the fall of 2020 has shown several notable trends:

- Massive business reorganization/restructuring is happening across the market. Companies are streamlining activities, controlling costs, and employing more and more digital tools to enhance productivity targets;

Executive Summary: Introduction

- Digitalization is also driving competitive positioning, customer acquisition, and connectivity, which is considered more important than ever in the current environment;
- New product and service innovation is prioritized through focused investments. Sustainability is poised to continue growing in importance. Attitudes are heading more into a green direction as consumers pay more attention to the social impact of what they purchase and consume. Updated CO2 emissions targets are creating demand for more energy-efficient products such as aerospace engines, building materials, and infrastructure design.

Ukraine, with its STEM-focused yet relatively cheap workforce, has been on the receiving end of some Advanced Manufacturing-related FDI over the years. A number of notable MNCs entered the market and set up production and R&D facilities; especially in the parts&components sectors. Most of those were built for supply chain integration purposes, exporting the majority of their products to Europe and globally, rather than targeting the local market.

The latter is a systemic problem – average disposable income and purchasing power of the Ukrainian population and business is too low to establish a materially significant local market for most of the Advanced Manufacturing products. Hence, interest towards Ukraine by sectoral investors has been sporadic at best. The amount of FDI in the sector compared to population size is inadequately small, especially when pitched against stellar FDI performance of much smaller peer countries like Slovakia.

The age-old adage that ‘money creates more money’ is just as true for FDI: successful investors bring in more investors. The more there are, the more they develop the required infrastructure and

new investors eagerly join the already established manufacturing clusters. Ukraine has failed so far to meaningfully ‘clusterize’ the AM cross-border investments and provide systemic support to those investors who were brave enough to start operations despite the lack of necessary eco-systems.

There are notable advantages, however, that could be used to enhance FDI into that sector, provided they are coupled with the strong political will to support both individual investors and the ‘clusterization’ concept:

- Wide variety of cheap potential production sites with reasonable basic infrastructure
- Proximity to European importers and the FTA with the EU
- Renewed negotiations on the so-called industrial visa-free regime with the EU – the ACAA agreement
- Low penetration rates for many of the AM products coupled with generally growing internal consumption, hinting at mid- and long-term significance of local markets – leading to localization and greenfield opportunities
- Access to and availability of diverse modes of export/import logistics. This has an effect on the potential ‘clusterization’ of AM-related facilities – they could be established in the form of Industrial Parks located nearby the key logistics facilities, etc.

So let’s see what the analysis uncovered. Importantly, we made a decision to show the AM industry as a whole, going into its key sectors as part of the overall analysis. Those sectors feature mostly the same gaps, barriers, and enablers – and should be digested as part of the bigger AM picture.



Executive summary

The list of advantages:

- ▶ A wide variety of developed and cheap production sites make it easy to scale existing and new production
- ▶ The proximity to the EU borders brings opportunities for both existing and potential Ukrainian production facilities by unlocking for them the growing EU market
- ▶ Growing internal consumption and low penetration rates points to (i) localization opportunities; (ii) ability to provide reliable market sales for potential players
- ▶ Skilled labor force with unique professional experience can serve sophisticated and value-added productions

Based on our analysis, we identified the following

KEY FACTORS

influencing the potential attractiveness of the advanced manufacturing sector for investors



The advanced manufacturing sector in Ukraine could be considered as an attractive one for potential FDI.

We see the following

KEY DIRECTIONS

Recent developments:



- ▶ Adoption of so-called 'investment nanny law,' which envisaged additional incentives and guarantees backed by the government, should further promote Ukraine as a winsome direction for investments
- ▶ Ukraine recently executed FTAs with [Israel](#), the [UK](#) and has ongoing negotiations with [Turkey](#) and [Serbia](#). EU-Ukraine trade under the DCFTA progressed considerably (export to the EU [reached \\$20.8 billion](#) in 2019), and the negotiations on DCFTA's update is expected in 2021
- ▶ In September 2020 local carmaker ZAZ and Groupe Renault achieved an agreement to produce Renault Arkana (SUV type) in Zaporizhzhia, which is a positive sign of local automotive industry recovery

I

Privatization of state-owned companies especially in heavy machinery subsector, including potential PPPs and JVs.

II

Brownfield projects considering vast availability of production sites and facilities as well as an extension of existing plants

III

Greenfield opportunities within industrial parks (as one of the global trends) as well as stand-alone projects

IV

Potential M&A targets with different tickets could be considered as well, including further extensive investments



Executive summary

Based on our analysis, we identified the following

KEY GAPS

limiting the potential attractiveness of the advanced manufacturing sector for investors



Nevertheless, gaps and barriers could be effectively mitigated, underpinned by the following

KEY ENABLERS

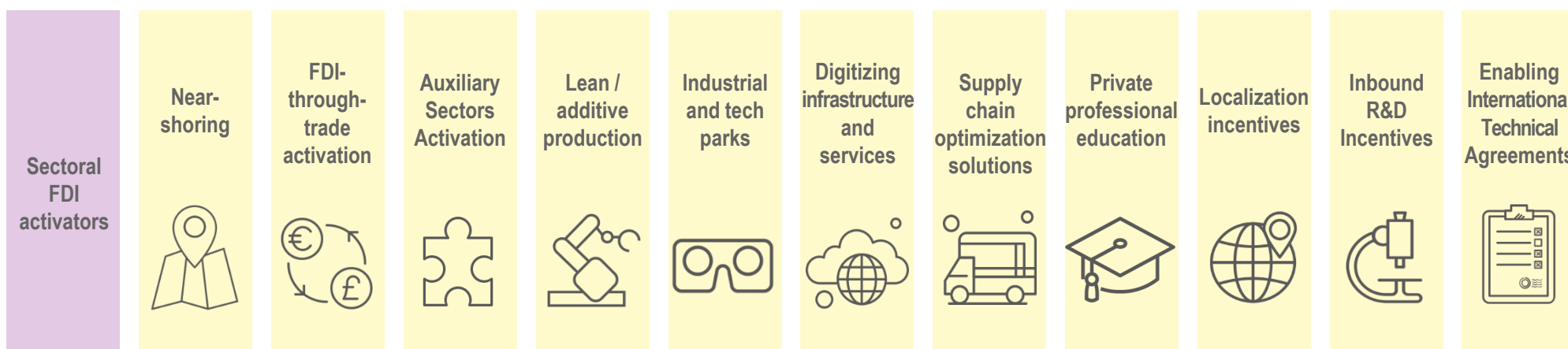
Market gaps:

- ▶ Lengthy and cumbersome customs procedures limited ability of companies to integrate into the global value chain
- ▶ For low-skilled positions, companies could experience a lack of blue-collar labor force as a result of migration
- ▶ Access to long-term and low-interest foreign funding is also limited by rigorous regulation and capital control
- ▶ Import and usage of aged and damaged vehicles negatively affect the local car market and safety on roads
- ▶ The inefficient and too complicated grid connection process is one of the major obstacles for FDI

Legal barriers:



- ▶ Lack of mutual recognition of certification with the EU is an additional barrier for export, as goods produced in Ukraine are subject to conformity assessment against the EU standards
- ▶ Lack of an effective state institution (ECA) capable of guaranteeing the rights of exporters discourages investments in the manufacturing of goods for export
- ▶ The environmental requirements for used and salvage title vehicles and second-hand equipment imported into Ukraine distort competition with the producers of the new equivalent products in the local market



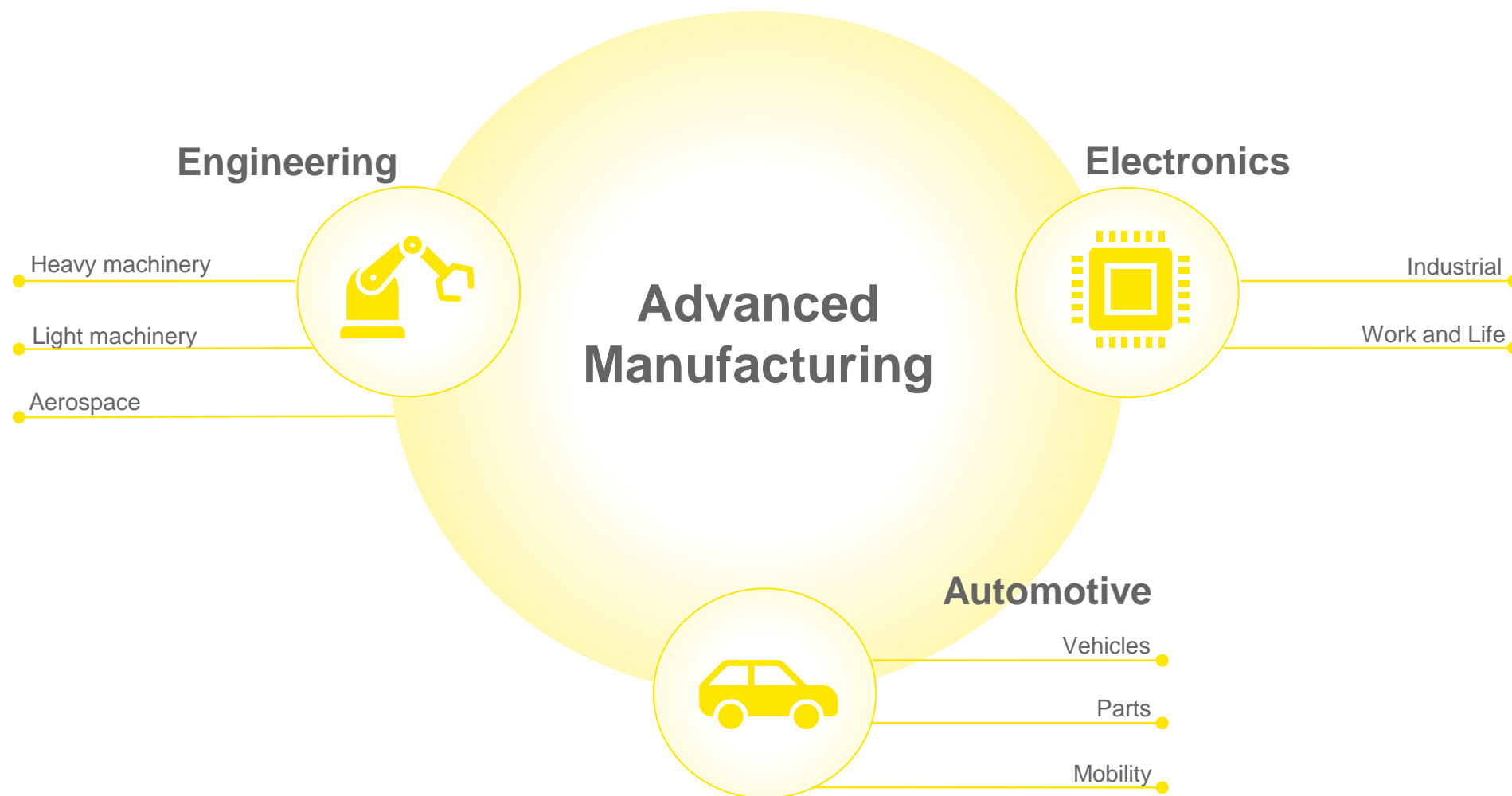
2.4.1. Introduction





2.4.1. Introduction

Ukraine's Advanced Manufacturing sector was decomposed into Automotive, Engineering and Electronics subsectors





2.4.1. Introduction

Global trends: Industrial parks

Key drivers

1 Manufacturer concentration

Industrial parks help manufacturers to reduce the costs and time for setting up production and focus on production and technology development.

2 Government support

Government is providing support to industrial parks by subsidizing utility tariffs, obtaining land on preferential terms, tax relieving, etc.

3 Financing

International financial organizations provide soft loans for industrial parks creation and reorganization into eco-industrial parks.



Expected result

Production capacity improve



Technology will bring economic growth in consequence of production capacity to improve, which may increase FDI.

Location advantage



Industrial parks accompany the reduction of production costs by opening manufactures in low-cost countries.

Business infrastructure



Industrial parks help overcome business infrastructure constraints and barriers to firm entry into the markets.

Industrial parks

Industrial parks are a relatively popular type of production organization all over the world. Single management entity with appropriate infrastructure, utilities, telecommunications, industrial waste, and wastewater treatment, emergency services, etc., within which the park members can carry out economic activities.

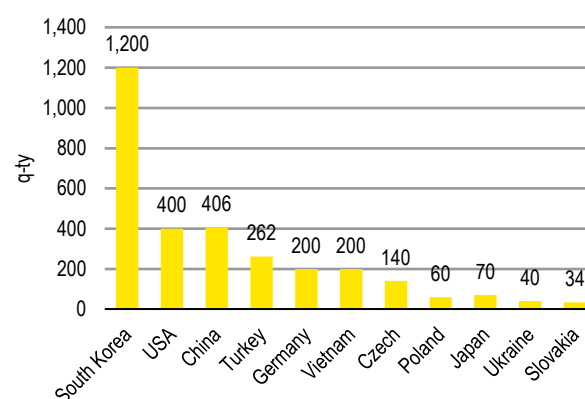
European industrial parks

Frankfurt-Hochst industrial park in Germany is one of the main European high technology centers, with more than 90 research and production companies on the territory of 460 ha.

Gyor industrial park in Hungary is a small city with a population of 130 ths people, that provide work of 100 companies from 13 countries on the territory 210 ha.

The Great Stone industrial park in Belarus, with a total area of 851 ha, is a community of 60 companies from 15 countries that generate USD 40 m budget revenues.

Industrial parks by countries in 2019



Industrial parks in the world

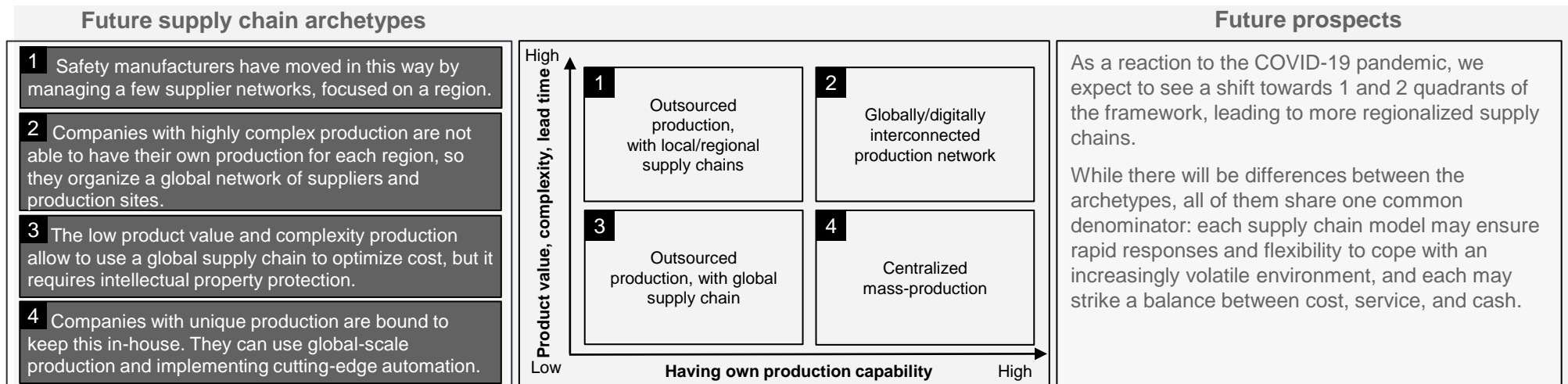
Such world-leading companies as Tesla, Apple, Microsoft, Bridgestone, Liebherr, Toyota, Yamaha, and many others use industrial parks to manufacture goods and develop new technologies.

A well-organized industrial park provides a growth point for the country. Vietnam is a good example, where there are currently about 200 industrial parks, which account for about 25% of the country's GDP and about 40% of all investments. In Hungary, roughly the same number of industrial parks create 200,000 jobs and account for 18% of GDP.



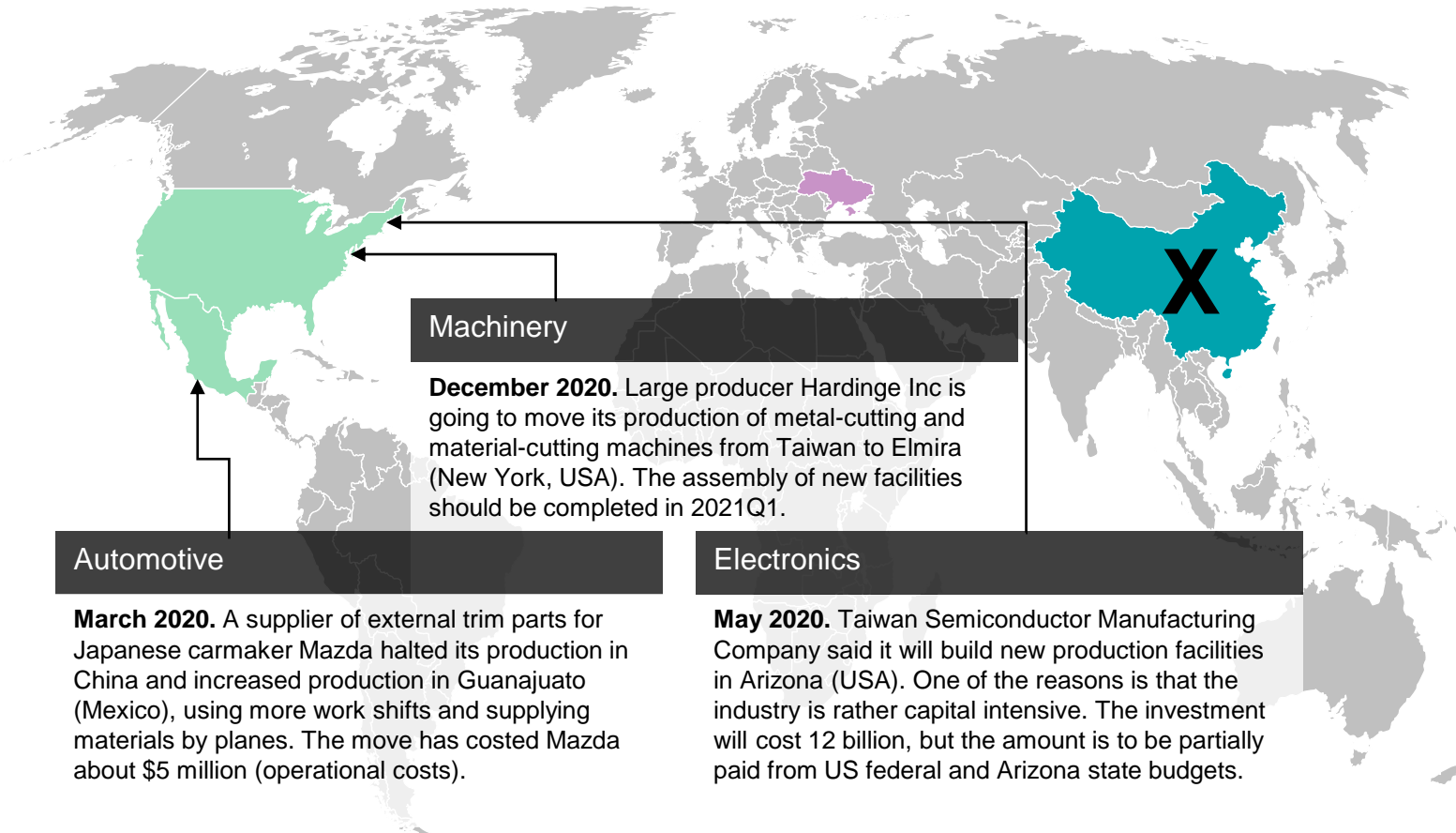
2.4.1. Introduction

Global trends: Resilient supply chains



2.4.1. Introduction

Global trends: the nearshoring decisions are yet to be implemented in practice



2020 EY Attractiveness Survey – Key Insights:

- Rather than a massive reshoring movement, a regionalization of supply chains is expected by 83% of the surveyed executives, with a move of certain production sites and their value chains closer to the borders of the EU and Africa. At the same time, some onshoring of critical activities will help create a more agile value network and restart production, while mitigating risk of disruptions in the future.
- Location considerations aside, 61% of businesses expect to reduce their dependence on single-dominant-source countries.
- Technology may have a further role in keeping manufacturing facilities open by improving health and safety: for example, technologies will be deployed to track employee health, reduce human-to-human interactions, and improve ventilation.

While COVID has undoubtedly planted the seeds of concern in regards to resilience of existing global supply chains and the value of keeping all manufacturing stock in China only, in practice diversification of that scale doesn't happen quickly. Claims and statements by major global corporates in regards to moving production facilities out of China or adding back-up factory floors elsewhere were made throughout 2020; however, actual moves will only be seen throughout 2021, and in many cases, even later – or not at all. The flurry of statements accompanying the COVID-influenced supply chain shocks was largely concentrated around 1Q-3Q 2020. It has since subsided to an extent, as China rebounded and the temporary instability of supply chains was somewhat mitigated. The de-risking and re-shoring trends are still there, but the overall scale may be lower than initially expected – and hence, countries fighting to benefit from those will have to make much more pronounced efforts to be seen by the global corporates who ultimately decide to reconfigure their supply chain structures.



2.4.1. Introduction

Global trends: Ride the green-wave

Key drivers

Emission reduction

1 Growth of attention to reducing CO₂ emissions that influence ozone layer destruction and leads to a global rise in temperature.

Waste recycling

2 An increase in demand for new types of waste recycling to replace landfills with waste disposal.

Eco-industrial parks

3 The community of businesses seeks to achieve enhanced environmental through collaboration in managing environmental and resource issues.



Expected result

Ride the green-wave

Decarbonization is a colossal topic for industrial equipment manufacturers. Decarbonization is the reduction in the carbon intensity of worldwide energy use. The government and international organizations stimulate the decarbonization process. For example, the European Union Commission has announced EUR 1 trillion in financing support across all sectors as part of the "Green Deal."

Higher productivity



Decrease power consumption and increase machine productivity makes the industry more attractive for FDI.

New industrial opportunity



The green-wave creates a demand for waste processing industry and equipment production, that open FDI opportunity.

Production rationality



The leading countries support the trend of waste-free production and recycling, which project funding entails in this way.

Big funding

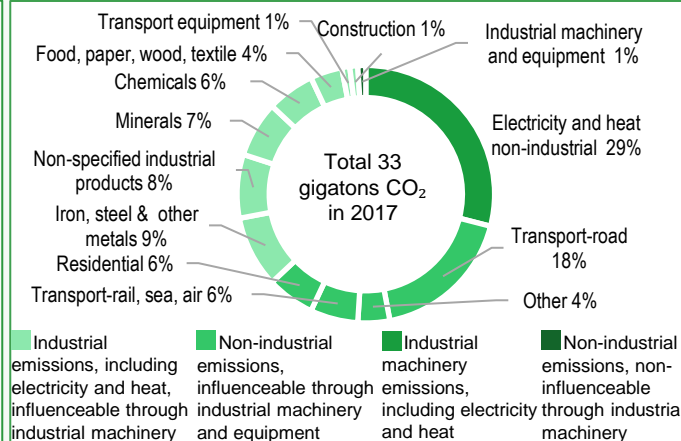
Three parts for seizing opportunity from The European Union Commission

Hardware improvements and offerings based on software, that allow for more efficient energy use of existing hardware.

Groundbreaking solutions and reinventions of entire production processes, for example using of hydrogen technologies in steel or cement production.

Carbon capture, utilization, storage technologies that allow for the capture of existing CO₂ and its use for new purposes such as chemicals.

Influence to worldwide CO₂-emissions by sector



Machinery industry impact

Machinery industry accounts for approximately 1 percent of total global emissions, but the goods of this industry - the machinery and equipment, in total, are responsible for almost 70 per cent of the emissions that could be affected by decarbonization technology.

Machinery industry reflects a huge lever for equipment manufacturers and a business opportunity in matters of environmental protection and FDI.

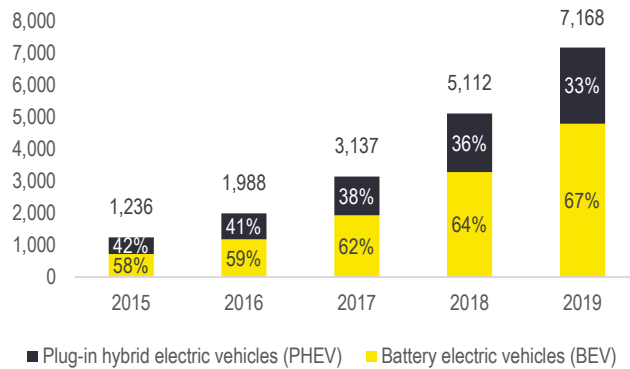
2.4.1. Introduction

Global trends. New mobility options

1 Expansion of EVs

Cheaper technologies, the economy of scale, and the development of the relevant infrastructure have led to a rapid increase in electric car sales. Over the last five years period (2014-2019), EVs grew with a GAGR of 60%

Global electric car stock, ths. vehicles



Source: IEA, EY analysis

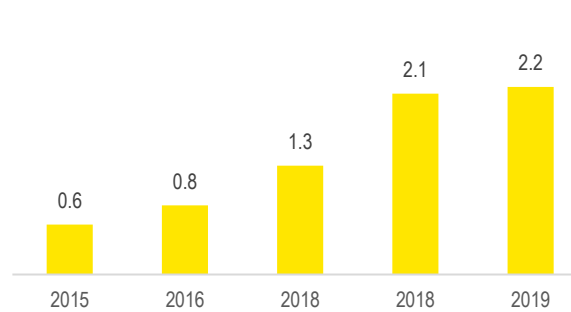
- ▶ Cheaper rides. Because of higher energy conversion efficiency, cost of a kilometer is lower.
- ▶ Cheaper maintenance. EVs are mechanically simpler, which implies less expense for spare parts and technical services.
- ▶ Because of environmental concerns, governments encourage EVs by lower tariffs, tax credits, cheaper or even free parking, permission to use public transit lanes, etc.

This creates opportunities both for new carmakers and for manufacturers of car parts. For example, EVs use a lot of wires.

2 Growing popularity of Mobility devices

Since most car traffic consists of commuters, personal mobility devices gradually replace personal cars as means of transportation within cities.

Global PELV sales, m units



Source: Market Data Sources, TBRC Estimates, TBRC Analysis

In some cases, personal mobility devices can be a more convenient mean of commuting:

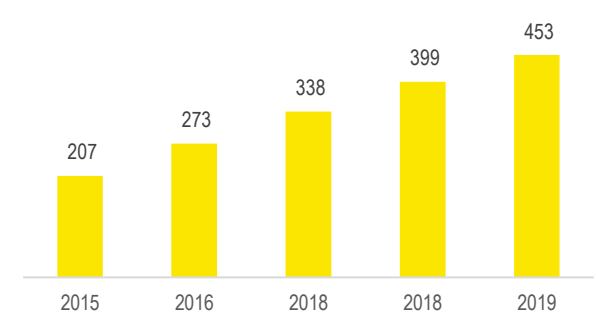
- ▶ Light electric vehicles are cheaper. Current best selling model price tag is about USD 1,500.
- ▶ Personal vehicles allow bypassing traffic jams, thus making commuting at par with personal cars or even public transit from the viewpoint of travel time. Also, it could be combined with public transit for longer intracity travels.

With proper climate and urban organization, light vehicles can offset some demand for passenger cars.

3 Ridesharing

In developed countries, especially with tight environmental regulations and in densely populated areas like big cities, car- and ride-sharing services replaces personal vehicles.

Global ridesharing users, m



Source: Statista

Carsharing is cheaper in terms of the total cost of ownership:

- ▶ Cheaper rides. Because of higher energy conversion efficiency, the cost of a kilometer is lower.
- ▶ Permanent parking (fewer vehicles means less demand for overnight parking);
- ▶ Temporary parking (less demand for parking in shopping malls, business centers, etc.).

As a result, the economy of scale leads to less demand for personal cars.



2.4.1. Introduction

Despite the damage caused by COVID-19, advanced manufacturing industries are showing recovery growths by the end of 2020

Actual thread from COVID

The outbreak of Coronavirus disease acted as a massive restraint on the advanced manufacturing industries in 2020 as supply chains were disrupted due to trade restrictions and consumption declined due to lockdowns imposed by governments globally.

Electronics

The electronics industry has been hit all over the world in the first half of 2020, starting from China, where volumes fell 13.8% y-o-y in February due to factory closures. As the virus spread globally, falls continued in Europe (11.3% y-o-y in April) and the US (5.6% on month in April) caused by factory closures and a consumer spending downturn. Supply-chain disruptions were initially a concern in Asia, but output has been relatively resilient with robust production in April and a steep rise in May. Despite sharp declines in Q2, Europe and US production had almost recovered in Q3 as lockdowns passed. The industry positions remained relatively strong due to one-off factors such as a move to working from home required companies to upgrade IT infrastructure, and increased demand for games led to households buying computers.

Engineering

A similar but deeper dynamic was seen in the engineering industry. While China had signs of recovery in April, the fall deepened in the US and Europe. In the US, machinery output was down by 9.1% y-o-y in March due to construction and mining machinery. With the decline in investment spending, lockdowns, broken supply chains, and factory closures, the fall was seen across all segments. The same trend was reported in the UK (21% y-o-y drop in March). The biggest manufacturers in the machinery industry were repurposed to make much-needed ventilators, masks, face shields, and other personal protective equipment (PPE), which led to a further reduction in the production machinery industry. The recovery of industry started in June both in the US and Europe but was slowed by persistent weakness in mining, oil and gas-field machinery (in the US), and machine tools (in Europe).

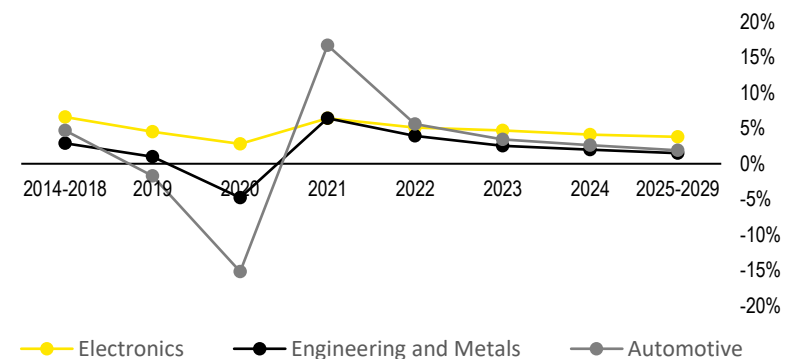
Automotive

Production in the automotive industry had seen the sharpest dynamic with vulnerable supply chains; the detailed analysis is provided on the following slide.

Future prospects

Oxford Economics predicts that advanced manufacturing industries will have strong recovery in 2021.

Global production of advanced manufacturing industries, Annual percentage changes



Source: Oxford Economics

Global electronics production has risen above its pre-crisis peak, both globally and in most large producers. Output in Q3 2020 was above its Q4 2019 level in China, the US, South Korea, and Taiwan.

The engineering industry has recovered by 97%. However, complete recovery is expected in 2022-2023, slowed by prolonged uncertainty and weaker financials across downstream sectors who may in the near-term prefer to rent machinery rather than invest in it directly.

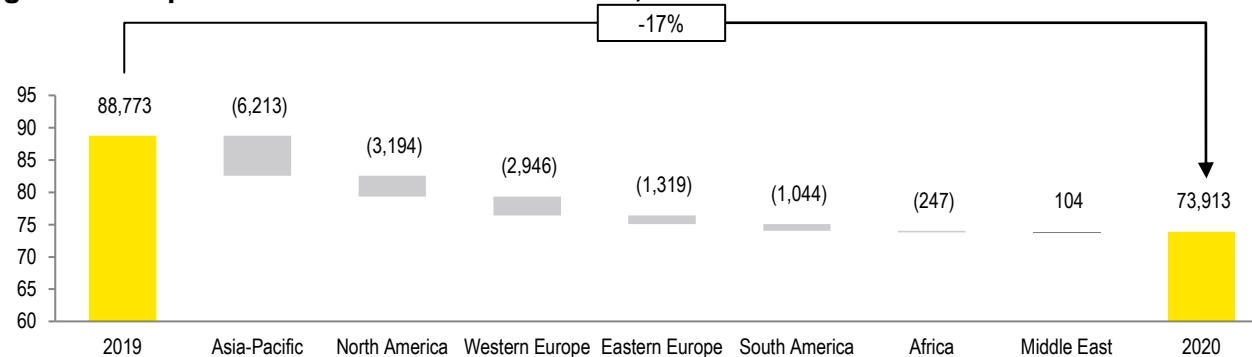
The main driver of the automotive recovery has been deferred demand. However, this driver is expected to fade in the coming months leading to a more gradual pace of recovery from Q4 2020, with the pre-Covid level of sales not being reached until 2022.

2.4.1. Introduction

COVID-19 impact on automotive industry

COVID-19 pandemic has had a fast and severe impact on the global automotive industry. It started from the disruption in Chinese parts exports and resulted in large scale manufacturing interruptions and closure of assembly plants all over the world. COVID-19 pandemic put additional pressure on the industry already coping with a downshift in global demand. According to the S&P forecast, in 2020, global light vehicles sales will fall by 20% compared to 2019 result up to 70-75 million units. The recovery of global sales to the 2019 level will take several years.

Light Vehicle production variance 2019 vs 2020, ths. units



Source: LMC Automotive Light Vehicle Product Forecast September 2020, EY analysis

- ▶ Hubei is an important sourcing hub for major OEMs, consisting of around 70 supplier plants and overall revenue of ~USD 3.9 b. It serves Guangdong, Chongqing, and Sichuan provinces for Honda and Dongfeng
- ▶ Hubei primarily offers just in time/ just in sequence needs of GM and Honda for interior components
- ▶ It also extends sourcing to Daimler in Beijing for lighting; Geely in Zhejiang
- ▶ ZF and Chassis Brake International are important braking suppliers in the region; that supply to OEMs outside Hubei (Geely, Jiangling, Honda, SAIC, VW, and Daimler); and out of China
- ▶ Dongfeng Automotive Component Group provides various parts such as camshafts and electronic control units (ECUs) among others



High effect of COVID-19 outbreak on global vehicle production

50%

Of all manufacturing in Wuhan is related to the automotive industry

Source: News articles, HIS Markit

The current crisis and subsequent disruption of the supply chains showed the vulnerability and the risks of the current component sourcing model in the automotive industry. The current supply chain relies heavily on mega suppliers, which helps to achieve economies of scale. However, the initial lockdown in China showed that this could have a domino effect across the global production network if the supply of components is disrupted.

Automotive companies are now trying to reduce overdependence on mega suppliers and aim to implement dual-sourcing strategies of critical components. This would make supply chains more flexible and make it easier to shift production between the factories in case of emergency.

Over the next 2-3 years, automotive companies are expected to accelerate investments into production automation tools and reshore part of the production from Asia. The US, Mexico, and Eastern European countries are expected to benefit the most as the largest car manufacturers will aim to strengthen their supply chains in North America and Europe and be closer to the end-consumers in these markets.

Source: Euromonitor International

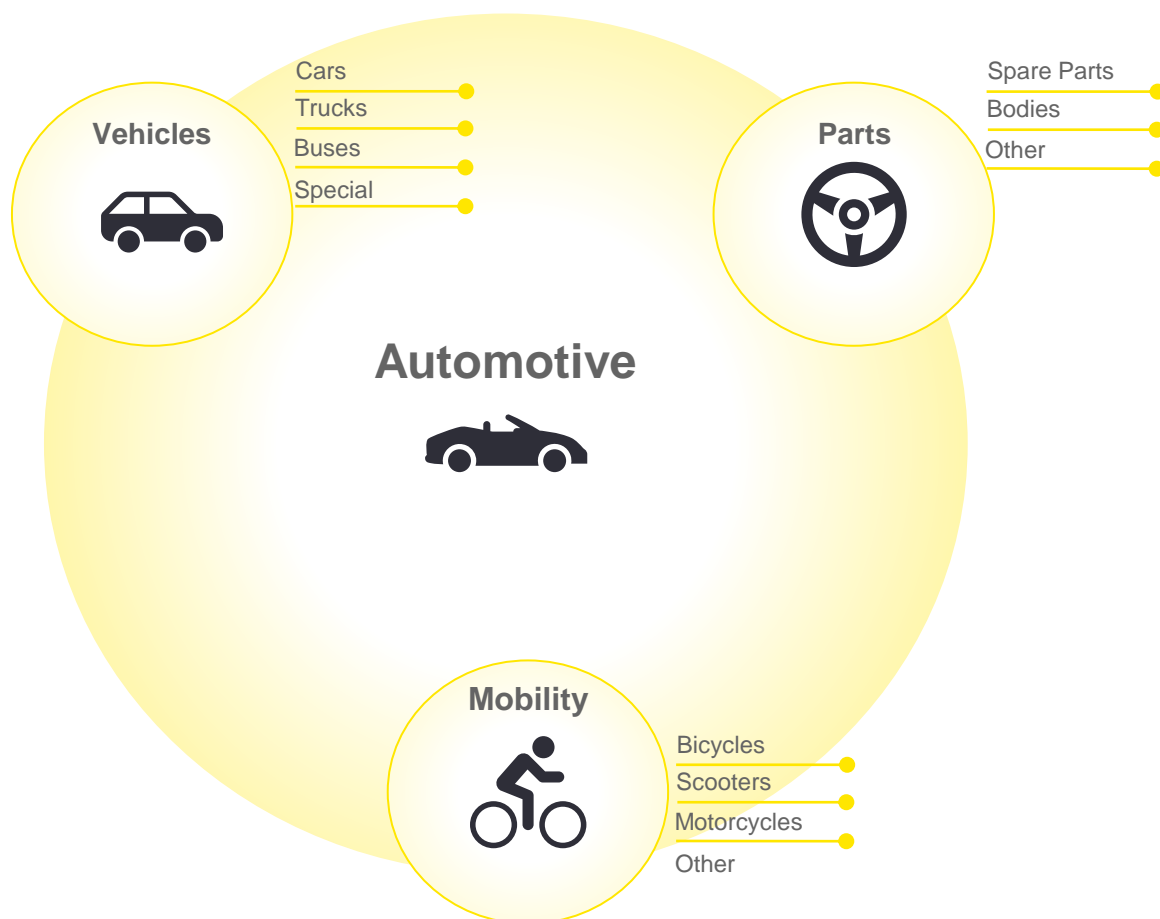
2.4.2. Automotive





2.4.2. Automotive

Sector decomposition



Key figures by subsectors

	Carmakers (cars, buses, trucks, SPVs) <ul style="list-style-type: none">▶ 65 industry entities▶ 7 100 employees▶ USD 438 m sales in 2019
	Body manufacturers <ul style="list-style-type: none">▶ 94 industry entities▶ 2 400 employees▶ USD 86 m sales in 2019
	Electrical parts producers <ul style="list-style-type: none">▶ 67 industry entities▶ 45 400 employees▶ USD 781 m sales in 2019
	Other parts producers <ul style="list-style-type: none">▶ 213 industry entities▶ 6 400 employees▶ USD 123 m sales in 2019
	Manufacturers of other vehicles <ul style="list-style-type: none">▶ 66 industry entities▶ 1 000 employees▶ USD 45 m sales in 2019



2.4.2. Automotive

A showcase for how vertical FDI could be attracted

Unlocked FDI from Brands*



“Ukraine should have its own automotive production and industry and not build its economy solely on trade or the agricultural sector. Otherwise, we will always lag behind others, and this cannot be our choice. So we will support the industry. As for the forms of such support, we need to think very carefully, to approach this issue as rationally as possible.”

Volodymyr Zelensky
President of Ukraine

“I am happy to open this plant in Kolomiya. This is a positive signal for both our company expansion and Ukrainian economy development” (2017, upon the opening of a new car wiring production plant, with plans to build more capacities and hire more people)”

Martin Stüttem
Leoni AG

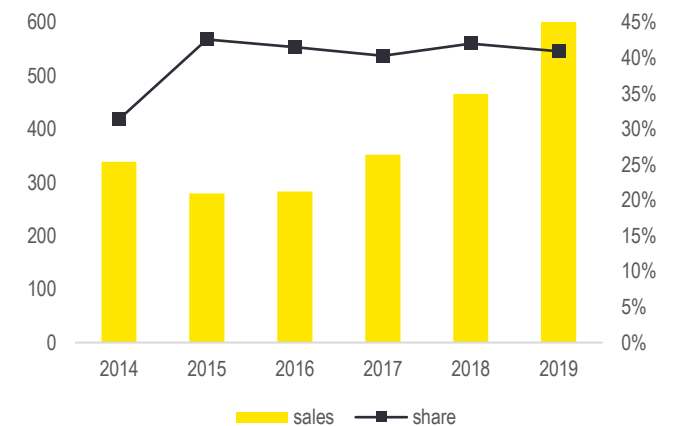
FDI equity

USD 83 m

Sales by FDI companies, 2019

USD 603 m

FDI driven sales, USD m



Source: Ukrstat, YouControl, CES analysis

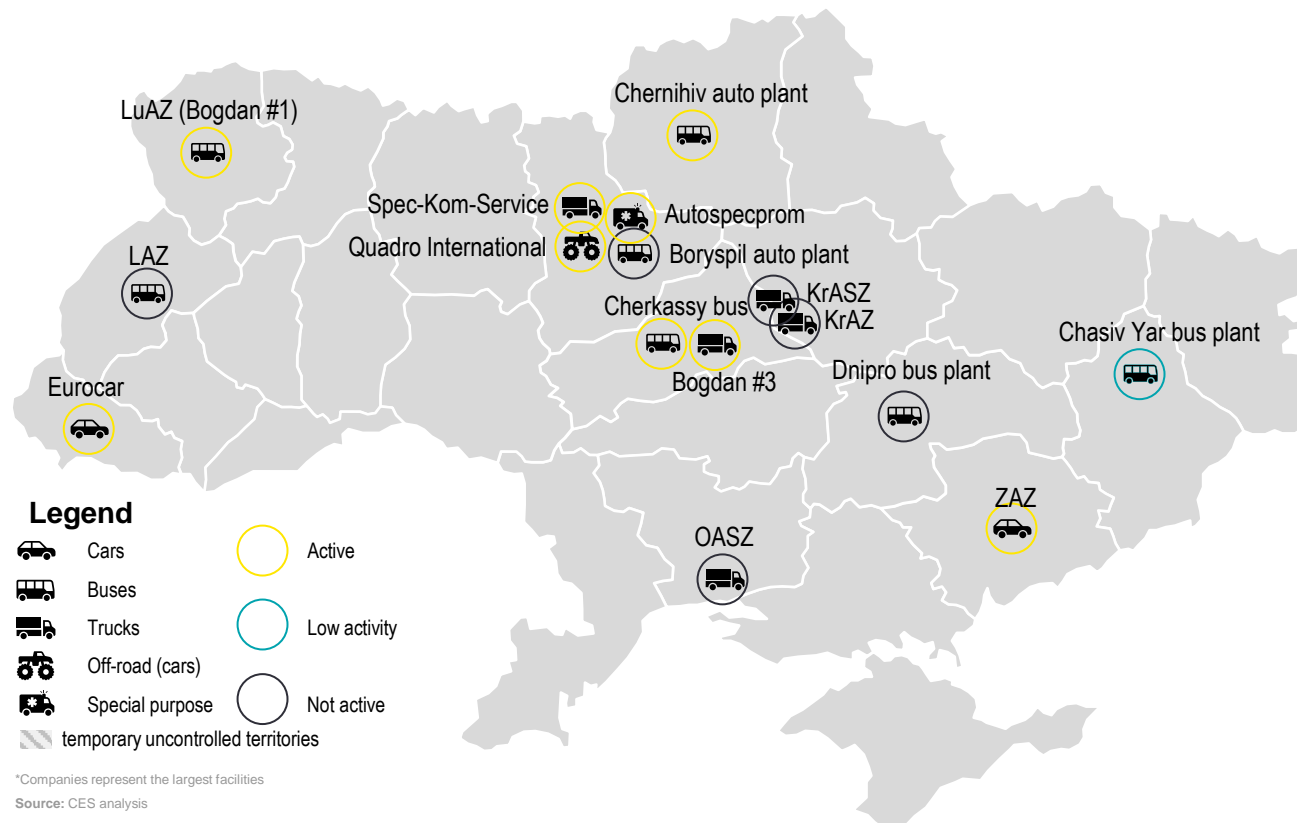
2.4.2.1. Automotive. Vehicles



2.4.2.1. Automotive. Vehicles

Ukraine has inherited relatively large vehicle production base after collapse of the USSR, but most of it is out of use....

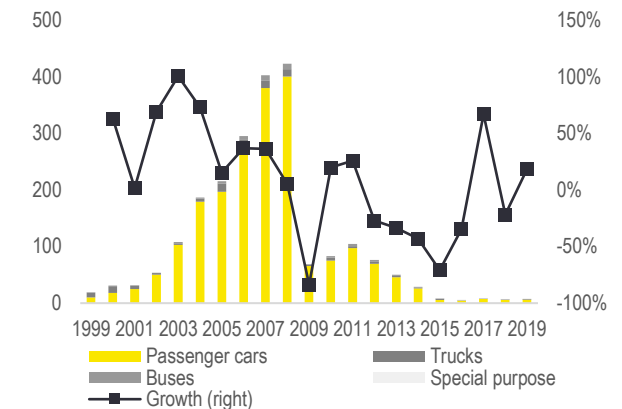
Vehicles production base in Ukraine*



There is no mass production as of now, but the legacy production base is capable of high volume mass production, including:

- ▶ Passenger cars 400 ths
- ▶ Trucks 50 ths
- ▶ Buses 25 ths

Motor vehicle production, ths. units



Source: OICA

Currently, Ukraine has no mass car production. In recent years, production volumes are about several thousand a year. The largest volumes are made on Eurocar, which makes Skoda cars from high-level blocs. ZAZ shows signs of recovery (a ninefold increase in Jan-Nov, but absolute volumes are low).

However, there is a lot of excessive production base (especially for bus and truck production) that is capable of high volume production. Historically, ZAZ and LuAZ peaked at 282 (including 159 full-scale productions) and 16,5 ths, respectively. KrAZ peaked at 30.6 ths, and LAZ peaked at 14.6 ths. With proper modernization, they could return to mass production.

Vehicle production peak in 2008, driven mostly by the manufacturing of passenger cars. In this year, both exports and local sales also peaked.



2.4.2.1. Automotive. Vehicles

.... So, Ukrainians purchase import vehicles either from official distributors or by “gray” schemes

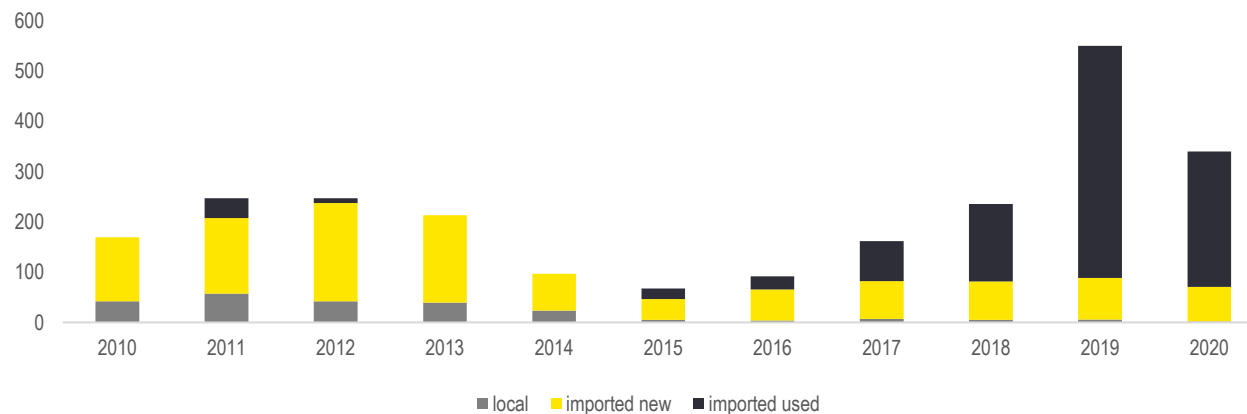
Demand and car sales

With a 42 m population, Ukraine naturally constitutes a large market for passenger cars. Sales of new cars peaked in 2008 with almost 600 ths units (and almost half of them were locally produced). In 2006-2008, demand was boosted by cheap foreign currency nominated bank loans and lax risk policies of banks (with zero down payment, no real background checks, etc.). After that, there were cycles tied to crises.

We estimate stable long-run demand for new cars at 200 ths per year, with additional low cost demand at about 100-150 ths. Currently, this segment is occupied by imported used cars, but the situation may change with the appearance of ultra-budget new cars. The average price of an imported car in 2020 is USD 7,000.

Thus, payable demand is limited by budget constraints. At the same time, Chinese cars are not too popular among Ukrainian consumers. Chery has only a 2,2% share of the new cars market, other producers have an even smaller share.

Sources of passenger car sales, ths. units*



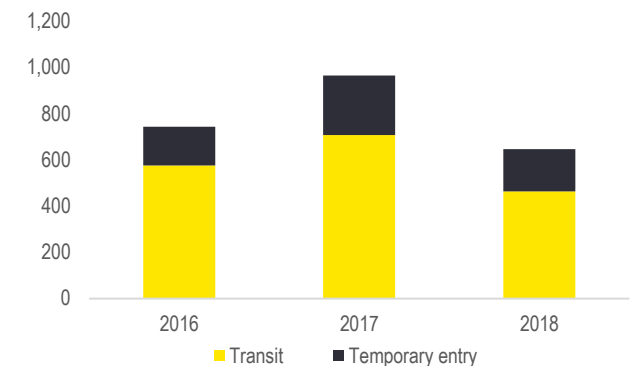
*Local secondary market was not considered

Source: OICA, Ukrstat, CES estimates.

Gray import

In recent years, the attractiveness of new cars decreased even more as a result of massive imports of used cars from Europe, often delivered retaining foreign registration (mostly Lithuanian and Polish) and thus without paying all taxes and customs duties. These “euroblyakhas” affected both locally made and imported cars, but local cars suffered more since they target the same consumer segment.

Grey import, ths. units



Source: SFSU

Due to the massive nature of the issue, the government was forced to allow the legalization of those imported cars, but with a deadline. However, some people failed to meet the deadline (even after it was postponed once) and continue to demand even better terms. But almost a million such cars have become legitimate.

2.4.2.1. Automotive. Vehicles

A vast amount of vehicle production facilities in the CEE decreases the possibility of investments in new manufacturing facilities in the region

European carmaker landscape is very saturated. There are 298 automobile assembly and engine production plants in Europe. 142 factories in Europe produce passenger cars, 38 make light commercial vehicles, 58 build trucks, 58 produce buses, and 71 make engines.

Most brands that are popular in Ukraine are made either in countries of origin (and more than 40% of new car sales are EU brands) or in Eastern Europe.

Together with other issues (weak local demand, used cars issue, high needed CapEx), this makes relocation of such production to Ukraine unlikely. Also, this requires an accumulation of a critical mass of part production assets. The only possible exception is Renault's (17% share in the Ukrainian market for new passenger cars) extension of the collaboration with ZAZ, which started in September 2020 with a production of an SUV model, Arkana.

Thus, the only possible development for Ukraine is increasing demand for vehicle parts and thus more greenfield and brownfield investment into parts' production.



Mutual benefits of cooperation of Ukrainian spare parts producers with CEE cars production facilities



Significant increase of stability and flexibility of supply chain

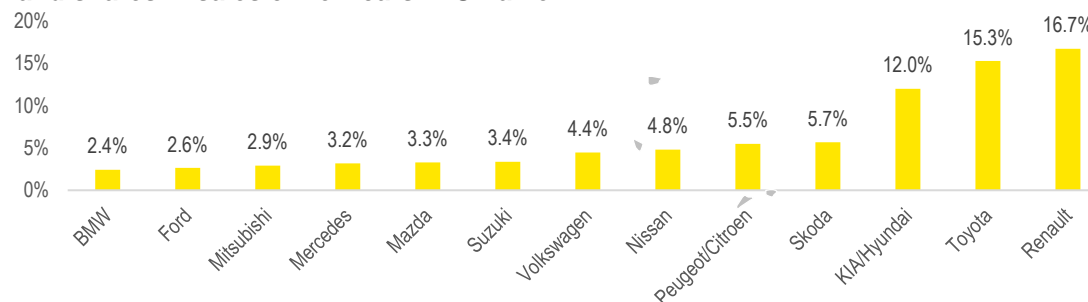


Opportunity to achieve economy of scale due to product specialization



Increase in trade with Europe

Brand shares in sales of new cars in Ukraine



Source: ACEA, Ukrautoprom, CES analysis

2.4.2.2. Automotive. Parts

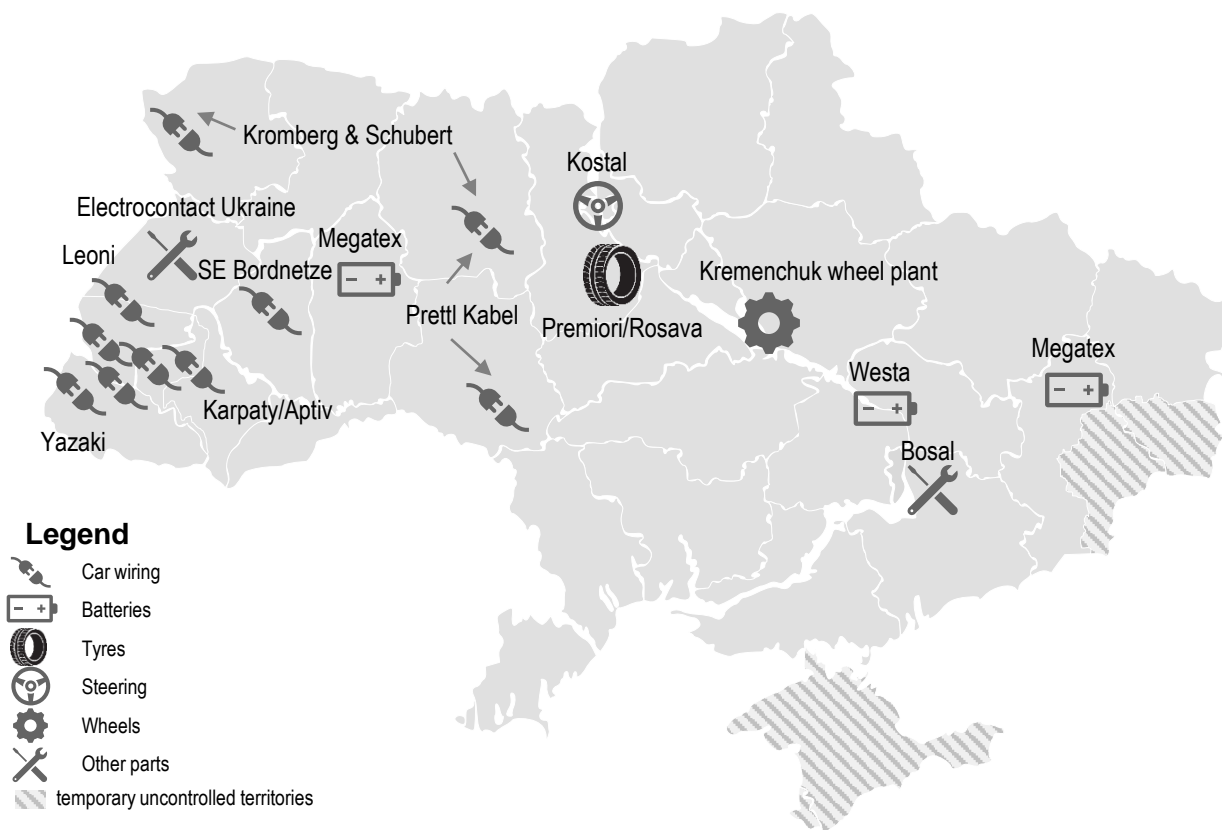




2.4.2.2. Automotive. Parts

Production of automotive spare parts has increased in the last years

Spare parts production base in Ukraine*



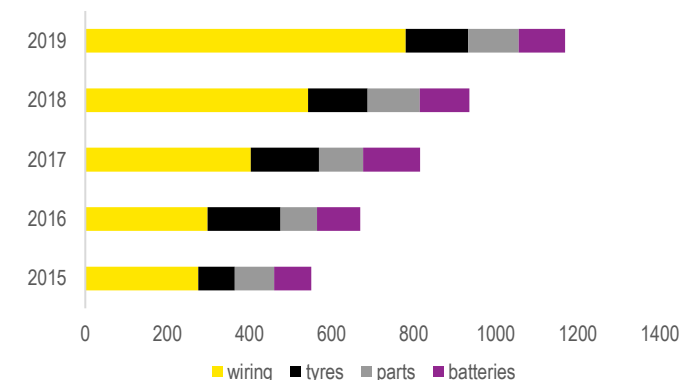
*Companies represent the largest facilities

Source: CES analysis

Ukrainian companies managed to attract major foreign investors that specialize in car wiring systems. More than a dozen of such companies are operating, mostly in Western Ukraine. They are producing car wires for major European car brands, such as Audi, BMW, Lamborghini, Mercedes, Opel, Porsche, and Volkswagens. Exports exceed USD 1 b per year.

Largest foreign owned companies were created close to borders to meet the demand for car parts from EU based car assembling plants.

Car parts' sales, USD m



Largest producers of automotive spare parts

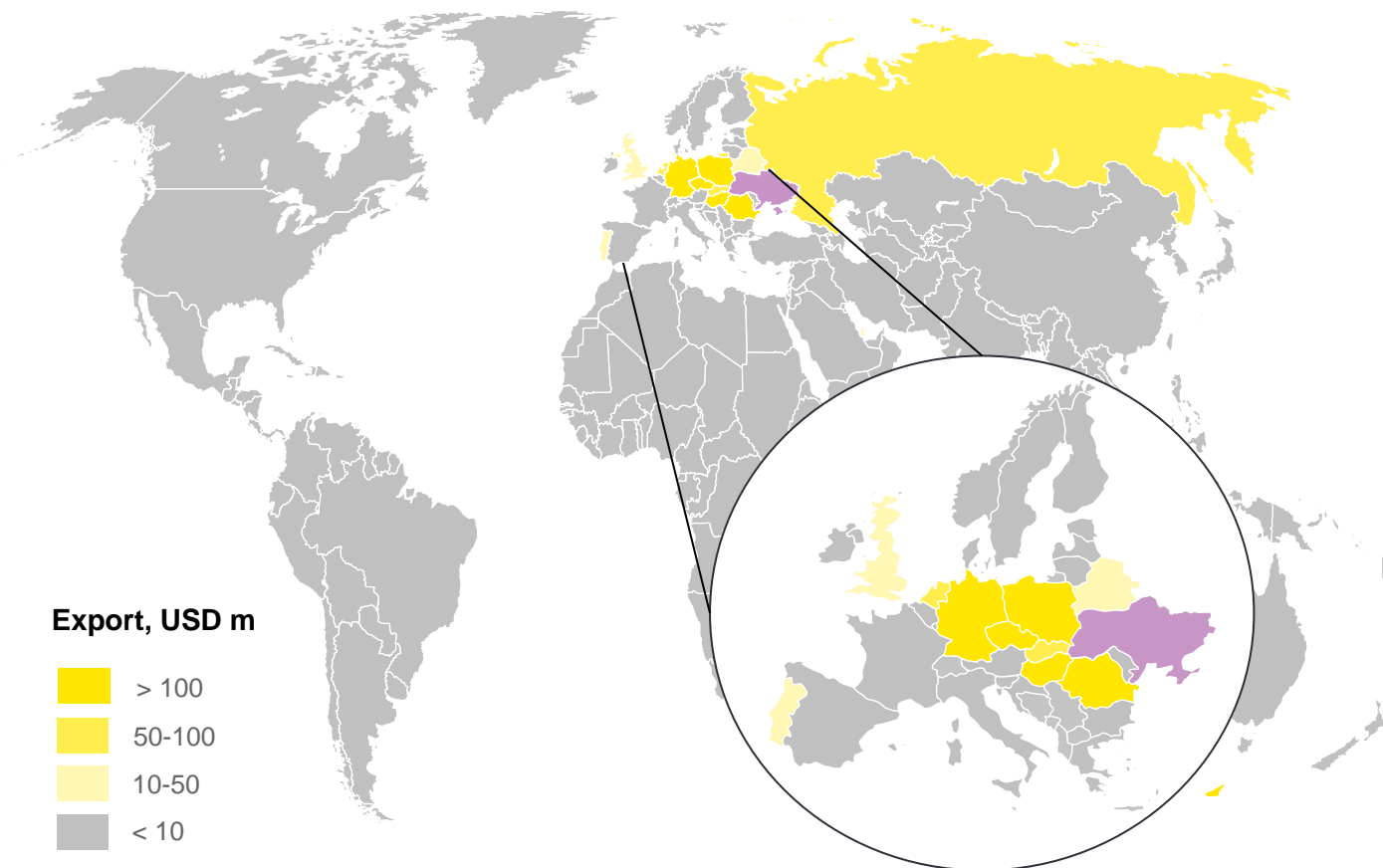
Company	Product	Sales, USD m, 2019	CAGR 2015-2019
Leoni Wiring	wire	176,0	25%
Premiori/Rosava	tyre	139,9	3%
Kromberg & Schubert	wire	127,7	24%
SE Bordnetze Ukraine	wire	71,6	17%
Yazaki Ukraine	wire	63,84	1%
Megatex	battery	44,9	1%
Kostal Ukraine	steering	44,5	19%

Source: YouControl



2.4.2.2. Automotive. Parts

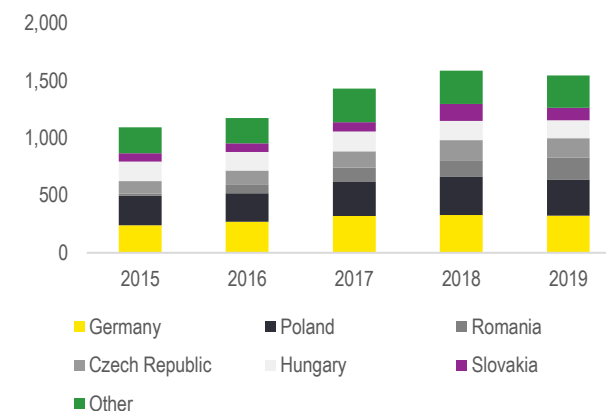
Export heat map



Unlike assembled motor vehicles, parts became a major product of Ukraine's export. It mostly refers to car wiring. Ukraine constitutes more than 3% of global exports and ranks 10th in the world, on a par with the Czech Republic and Serbia. Among European countries, only Romania has a larger share.

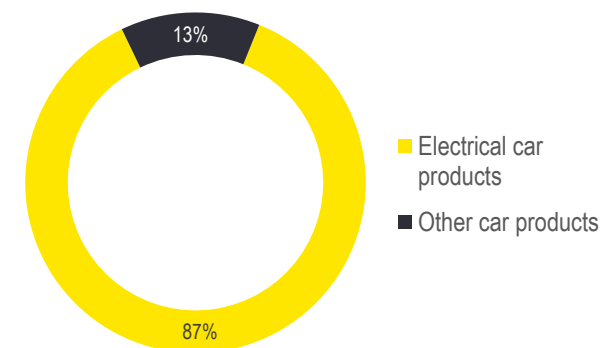
Mostly the wires are exported to the EU. Most companies target one country, some of them even sell their wires to a single company (however, this could mean that the buyer is a trading company, not a carmaker). Traditional markets stabilized over the last five years, but new markets emerged (Romania and Netherlands).

Export by country, USD m



Source: State Statistical Service of Ukraine, ITC Trademap

Export structure by subsector, USD m



Source: ITC Trademap



2.4.2.2. Automotive. Parts

Electric auto parts

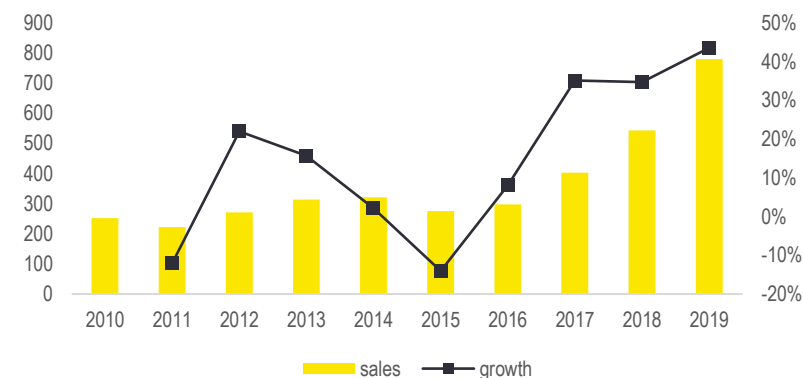
Ukrainian car wiring production facilities were mostly created as greenfield projects by major European companies. This is vertical (efficiency-seeking) FDI primarily driven by relatively cheap labor.

At the same time, raw materials are mostly imported. Only small fraction of these wires (up to 20%) are made from local raw materials, the majority is manufactured from a customer's materials (tolling scheme). This reinforces the need to locate production facilities close to EU borders since transportation occurs twice.

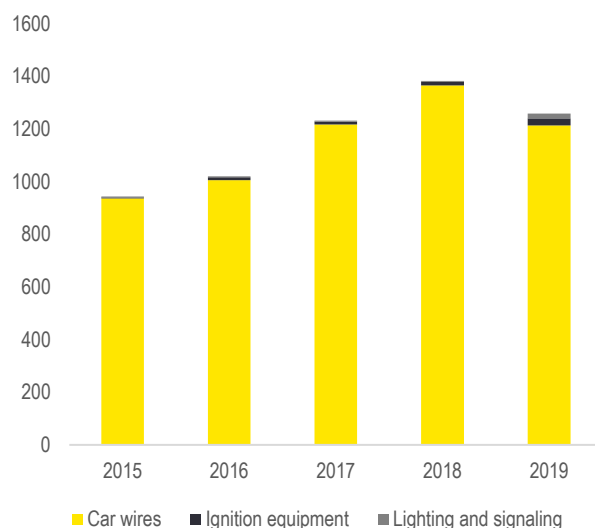
For example, Zakarpattya borders with four EU countries, has five Land border crossings and good railway network. The region is close to M3 motorway in Hungary that has further connections with European road grid.

Other electric products include steering columns (represented by Kostal) and seat heating (Genterm). Also, Ukraine produces ignition systems (spark plugs, distributor, starters and parts thereof).

Electric auto products sales, USD m



Key export products, USD m

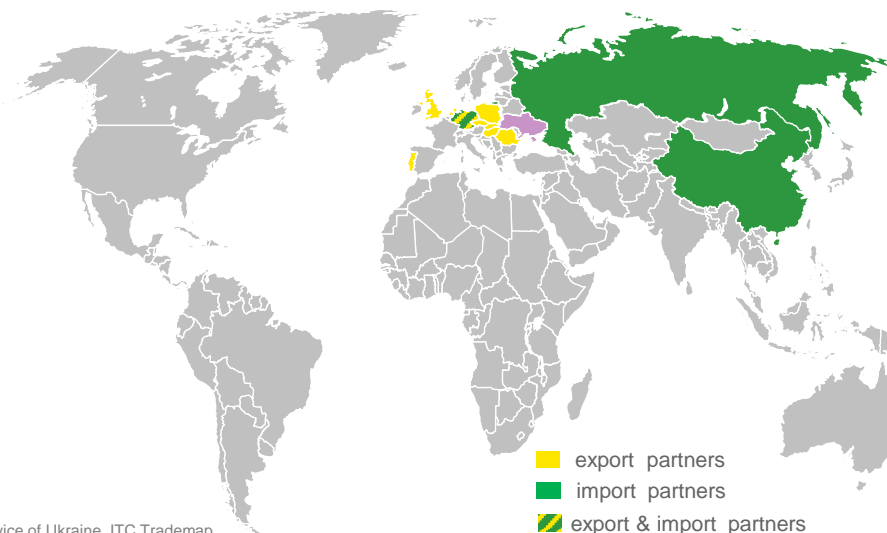


Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Germany
Export: USD 319 m
CAGR 4%
Poland
Export: USD 300 m
CAGR 1%
Romania
Export: USD 187 m
CAGR 47%
World Total
Export: USD 1371 m
CAGR 5%

Source: State Statistical Service of Ukraine, ITC Trademap
Note: due to statistical discrepancies in 2019, we use country foreign trade data from the SSSU for export maps and total export data from ITC Trademap for export product plots. Total foreign trade data from ITC Trademap are displayed in brackets for information.



TOP Import Partners

China
Import: USD 25 m
CAGR 14%
Russia
Import: USD 10 m
CAGR -6%
Germany
Import: USD 9 m
CAGR 21%
World Total
Import: USD 85 m
CAGR 7%

Source: Ukrstat



2.4.2.2. Automotive. Parts

Other parts

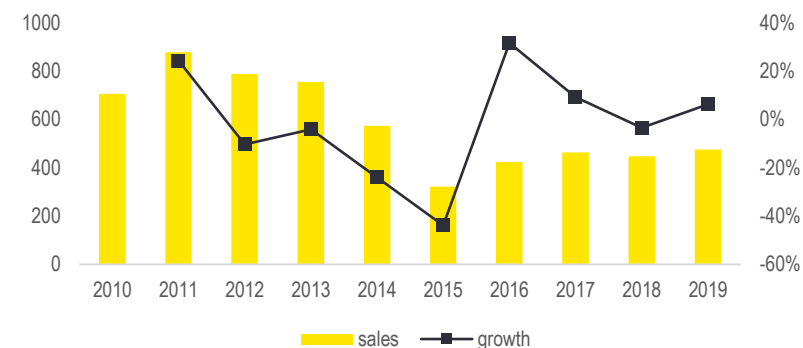
Most other automotive part production facilities are legacy base that works mostly for the local market and, from an export viewpoint, for countries from the former Soviet Union, mostly for Russia and Belarus (deliveries to these countries are declining, though).

However, there are exceptions, but they are rather of chemical nature. First, car battery production is new. There were three major producers (only two survived). Some batteries are delivered abroad, too (for Renault production in Romania). Second, pneumatic tire production is legacy, but with some heavy investments that allowed it to make a competitive product in the low segment (about 25% of the local market).

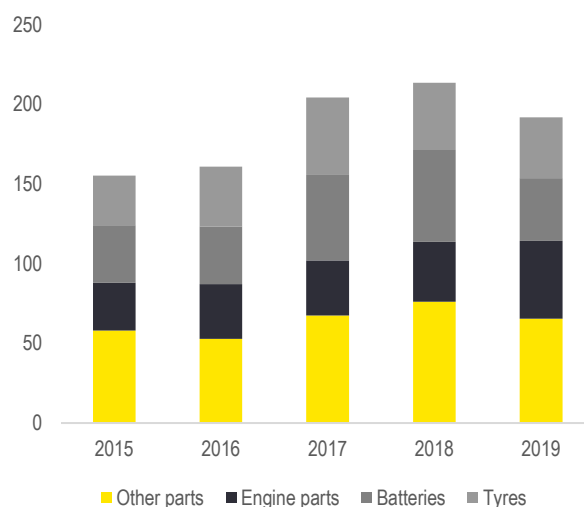
Other products include car bodies, wheels, steering systems, seats, exhausts, engine parts, brakes, suspensions, clutches, and radiators.

Unlike wiring, in all these segments Ukraine is a net importer, which represents potential demand for new production facilities.

Other auto products sales, USD m



Key export products, USD m



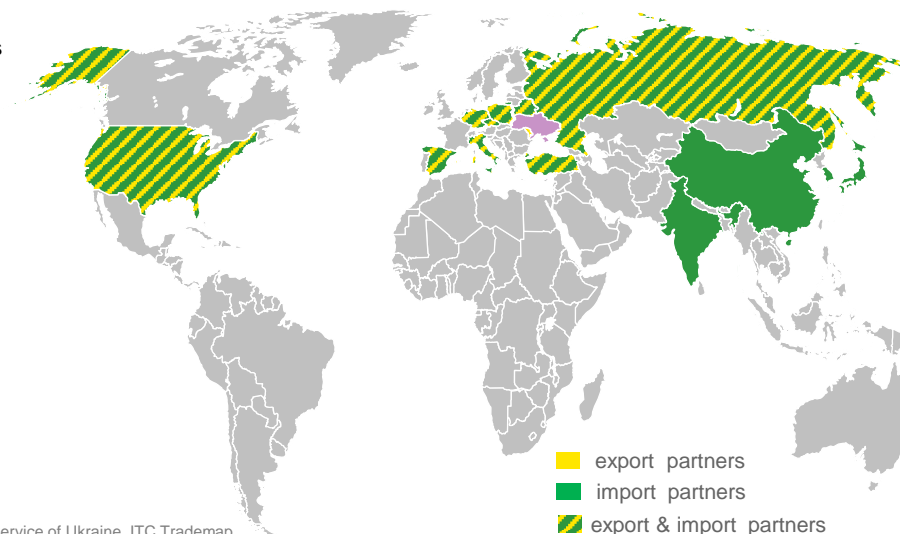
Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Russia
Export: USD 55 m
CAGR -16%
Belarus
Export: USD 16 m
CAGR -11%
Poland
Export: USD 15 m
CAGR 27%
World Total
Export: USD 173 m
CAGR -11%

Source: State Statistical Service of Ukraine, ITC Trademap
Note: due to statistical discrepancies in 2019, we use country foreign trade data from the SSSU for export maps and total export data from ITC Trademap for export product plots. Total foreign trade data from ITC Trademap are displayed in brackets for information.



TOP Import Partners

China
Import: USD 245 m
CAGR 13%
Russia
Import: USD 106 m
CAGR -4%
Germany
Import: USD 78 m
CAGR 8%
World Total
Import: USD 1063 m
CAGR 9%

2.4.2.3. Automotive. Mobility

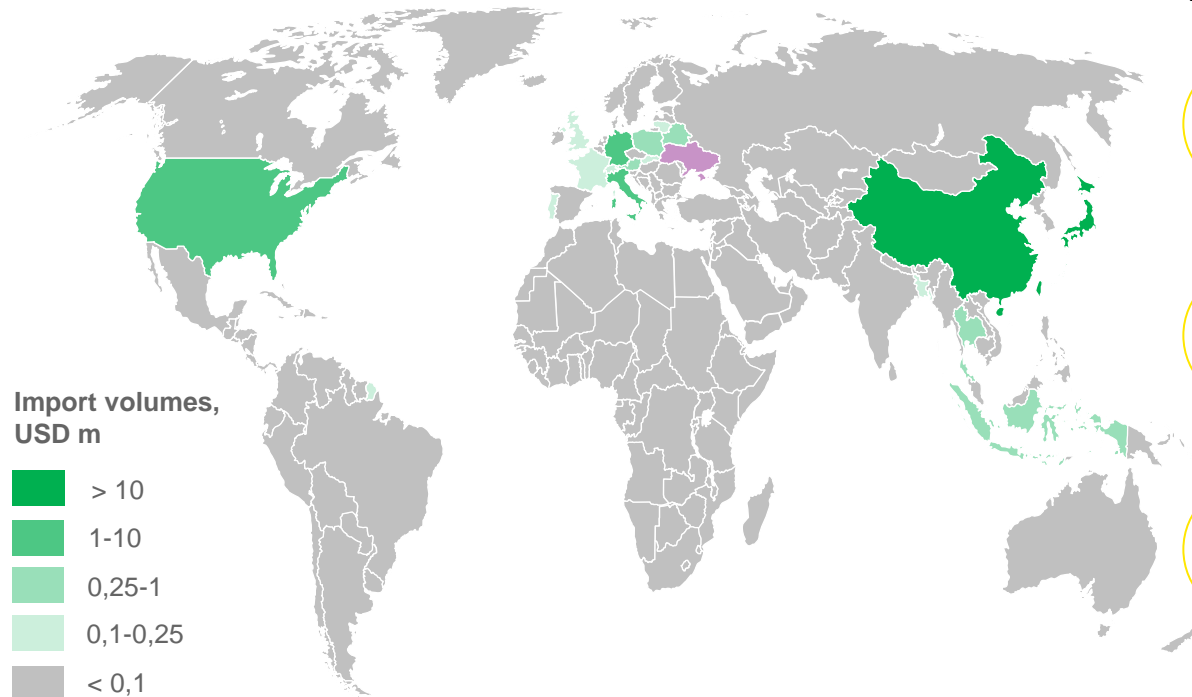




2.4.2.3. Automotive. Mobility

Imports to Ukraine: TOP-5 largest imported goods (localization potential)

Import heat map








Ukraine gradually catches up with global fashion and adopts new means of personal transportation. Previous years were marked with two-digits growth of imports of various types of two-wheelers, especially light motorcycles and electric bikes.

Local production of such products is limited. The largest segment is classic bicycle production, 100-150 ths units per year. The production vase comprises one medium sized enterprise (Kyiv bicycle plant “Ardis,” USD 11 m sales in 2019) and several small (including Kharkiv bicycle plant that once was capable of producing 800 thousand units per year). The most well-known Ukrainian brand “Comanche” is assembled in China. The same is true for electric bikes Delfast. Motorcycle production ceased to exist.

At the same time, the import of traditional two-wheelers, like mopeds and motorcycles, restored almost to the pre-crisis level. This makes Ukraine potentially attractive country FDI targeting local demand, especially considering the existence of a production base capable of mass production.

TOP-5 largest from imported goods

	Bicycles Volume in 2019 : USD 29 m CAGR 2015-2019: 12%	Suppliers Greater China – 95% Belarus – 2% Cambodia – 1%
	Heavy motorcycles Volume in 2019 : USD 17 m CAGR 2015-2019: 9%	Suppliers Japan – 28% Germany – 27% USA – 19%
	Light motorcycles Volume in 2019 : USD 14 m CAGR 2015-2019: 3%	Suppliers Greater China – 80% India – 11% Japan – 4%
	Mopeds Volume in 2019 : USD 6,1 m CAGR 2015-2019: 14%	Suppliers Japan – 99% Greater China – 1%
	Electric bikes Volume in 2019 : USD 5,6 m CAGR 2015-2019: 54%	Suppliers Greater China – 47% Malaysia – 19% Germany – 12%

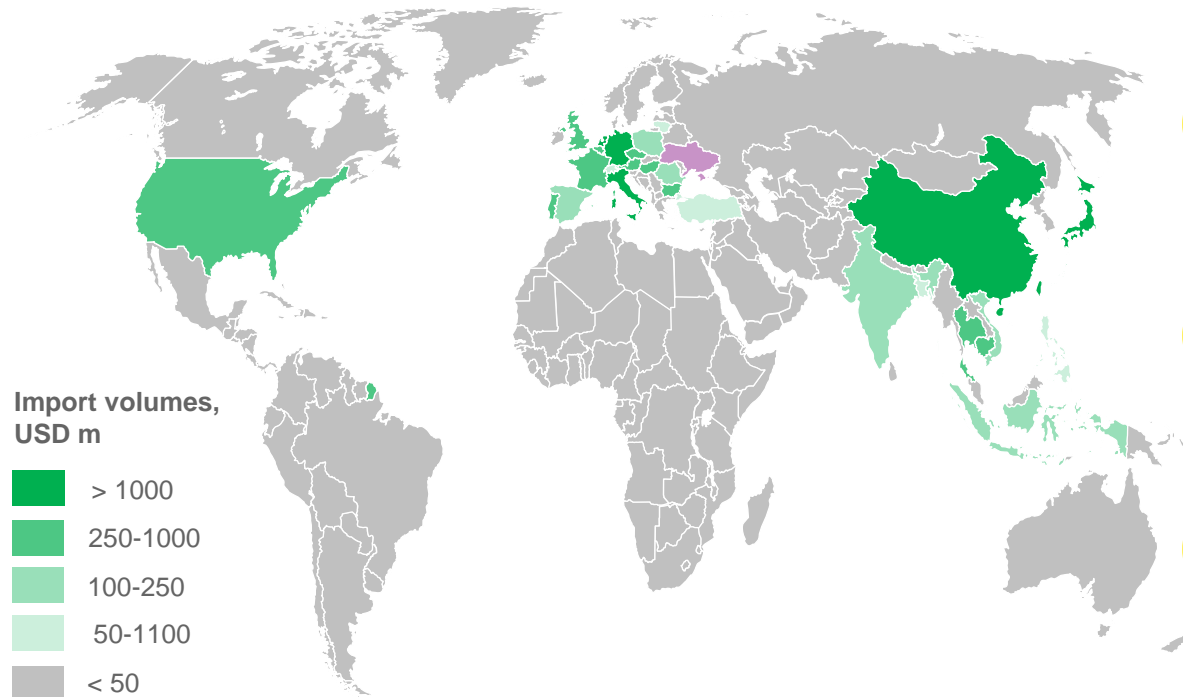
Source: Ukrstat



2.4.2.3. Automotive. Mobility

EU import of mobility products

Import heat map



Light personal vehicles show significant growth in sales in the European Union in recent years, especially electric bikes (share of exports increased from 6% to 28% during 2014-2019). Electric bikes are to replace other light two-wheelers, both bicycles, and mopeds, in coming years. Light electric vehicles association forecasts annual sales of these devices will increase to 125 million in 2030, and ExtraEnergy expects growth further to 250 million in 2050.

There are two main sources of deliveries, both could be at least partially replaced by production in nearby countries. First is the EU itself, that constitutes more than half sales in monetary term (however, a lot of parts are imported). Second is East Asia, including Greater China, Japan, Thailand, Cambodia, and Vietnam.

TOP-5 imported goods

	Heavy motorcycles Amount: USD 5,397 m Share: 36% CAGR: 2%	Suppliers Japan – 24% Thailand – 12% Germany – 12%
	Electric bikes Amount : USD 4,292 m Share: 28% CAGR: 43%	Suppliers Greater China – 37% Netherlands – 13% Germany – 12%
	Bikes Amount : USD 4,101 m Share: 27% CAGR: 1%	Suppliers Greater China – 18% Germany – 16% Netherlands – 12%
	Light motorcycles Amount : USD 1,129 m Share: 7% CAGR: 1%	Suppliers Greater China – 24% Italy – 16% Thailand – 11%
	Mopeds Amount : USD 361 m Share: 2% CAGR: -3%	Suppliers Greater China – 41% Italy – 29% France – 6%

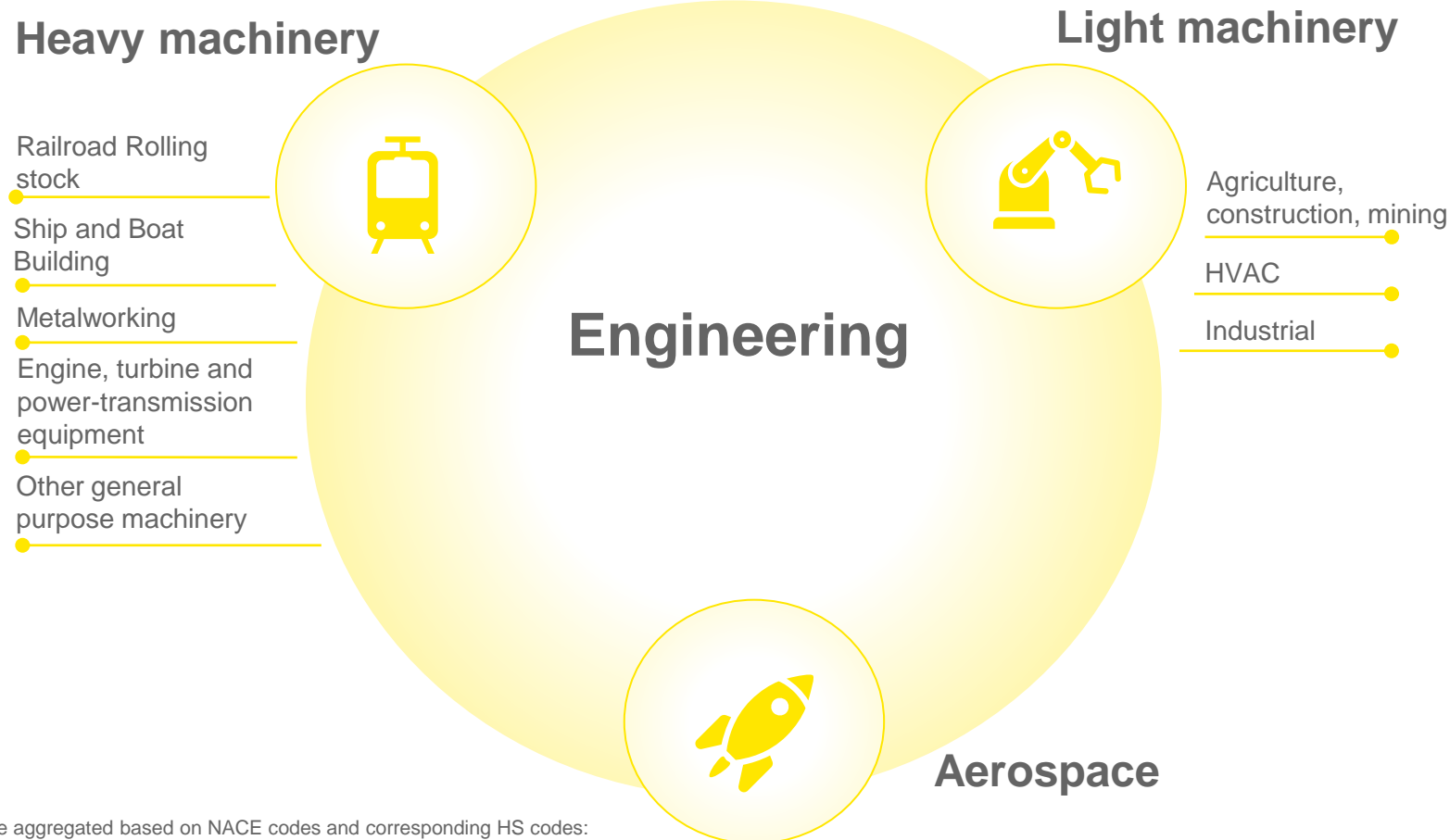
Source: Ukrstat

2.4.3. Engineering



2.4.3. Engineering

Ukraine's Engineering sector includes the following subsectors:



The industries were aggregated based on NACE codes and corresponding HS codes:

Railroad Rolling Stock: 30.20; Ship and Boat Building: 30.11, 30.12; Metalworking Machinery: 28.41, 28.91; Engine, Turbine and Power Generation Equipment: 27.11, 28.11-28.15; Other General Purpose Machinery: 28.22, 28.24, 28.29;

Agriculture, Construction and Mining Machinery: 28.30, 28.92; Heating, Ventilation, Air Conditioning and Commercial Refrigeration (HVAC): 28.21, 28.25; Industrial Machinery: 28.49, 28.93-28.96, 28.99;

Aerospace: 30.30

Note: Other general purpose machinery segment is included to the *heavy machinery* subsector and its main product group is lifting and handling equipment; however, there are also such products as packaging equipment, tools for working in hand etc. that are more relevant for light machinery.



2.4.3. Engineering

High level review of FDI in heavy machinery production

Unlocked FDI from brands
(sales UAH 100+ m)



"Ukraine is a dynamic European country that is improving its investment climate to compete globally, create new business opportunities and increase foreign direct investment."

Volodymyr Zelensky
President of Ukraine

"Our US-based team is incredibly impressed with the engineering skills and manufacturing capability available in Ukraine. The growth of our company to include these new team members will allow us to dramatically accelerate the pace of development of our future Firefly launch vehicles."

Dr. Tom Markusic
Firefly CEO

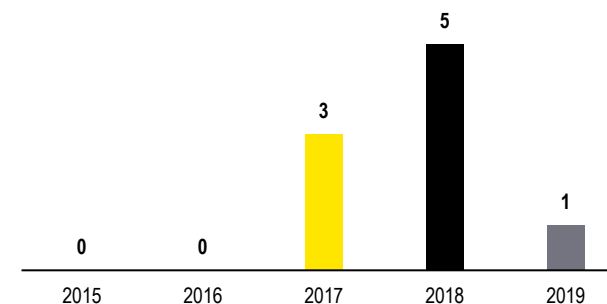
FDI equity

USD 26 m

Sales by FDI companies, 2019

USD 322 m

Number of FDI projects in machinery and equipment in Ukraine

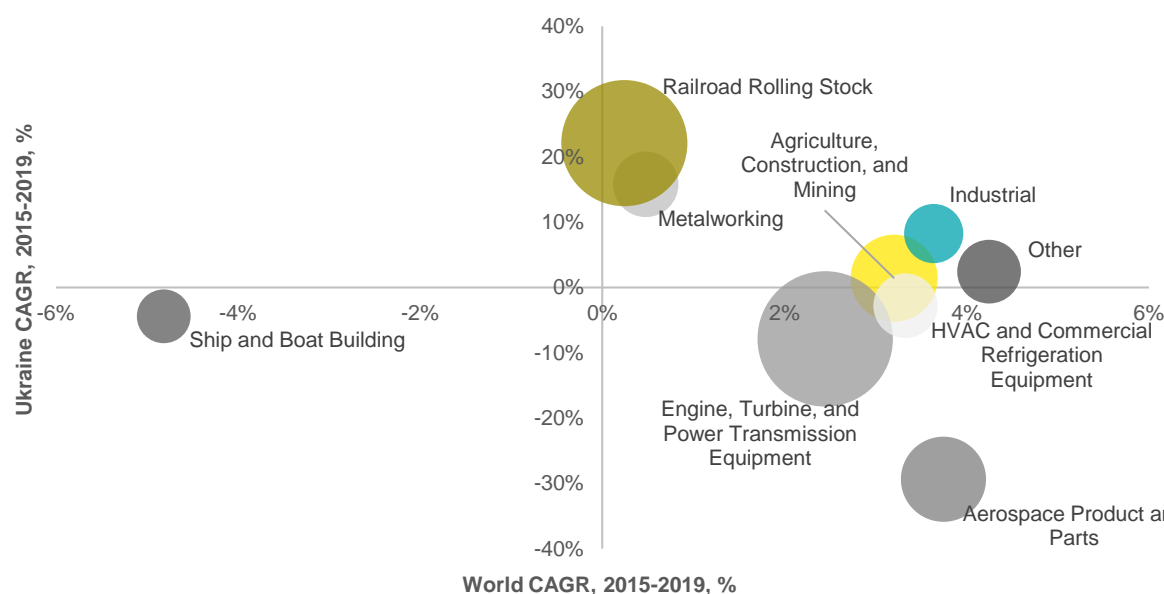


Source: EY internal resources
Note: Unlocked FDI



2.4.3. Engineering

The fastest growing subsectors that have the highest potential are railroad rolling stock, metalworking and industrial machinery



Besides two obvious subsector growth potential indicators as CAGR for Ukraine exports and global growth, the EU imports growth represents the dynamic of demand in Ukraine's key market, and the volume of EU's exports from China indicates the potential for the relocation of production facilities closer to EU borders in each of the segments.

According to this scoring, the fastest growing Ukrainian subsectors have the highest potential: railroad rolling stock, metalworking machinery, and industrial machinery. Other general purpose machinery (mainly lifting and handling equipment), as well as agricultural, construction, and mining machinery, are marginally attractive, while the other segments are lagging.

Due to the breaking ties with Russia, the export of aerospace products and parts plummeted: therefore, in this subsector, we see opportunities for FDI in R&D facilities rather than manufacturing.

The subsector of railroad rolling stock and parts is the fastest growing in terms of EU import (7.4% CAGR 2015-2019). However, Ukraine should adjust products to EU standards (e.g., rail width) for the export.

Potential scoring table for subsectors

Subsector	EU import CAGR, 2015-2019, %	EU import from China, 2019, USD m	Export from Ukraine, 2019, USD m	Export from Ukraine CAGR, 2015-2019, %	Average score*
Railroad Rolling Stock	7.40%	620	469	22.10%	8.7
Metalworking Machinery	3.10%	2,369	126.2	15.80%	5.7
Industrial Machinery	4.70%	4,148	102.9	8.30%	2.8
Other General Purpose Machinery	6.40%	8,377	120.3	2.40%	0.8
Agriculture, Construction, and Mining Machinery	6.10%	4,215	223.6	1.50%	0.3
HVAC	5.20%	4,842	123	-2.80%	-1.5
Engine, Turbine, and Power Transmission Equipment	4.90%	24,958	541.4	-7.90%	-2.2
Ship and Boat Building	1.20%	1,424	85.2	-4.40%	-2.5
Aerospace Product and Parts	3.30%	3,142	214	-29.40%	-12.1

*The average score is calculated as a mean of the subsector's deviation from the average of each variable represented in table.

2.4.3.1. Engineering. Light machinery

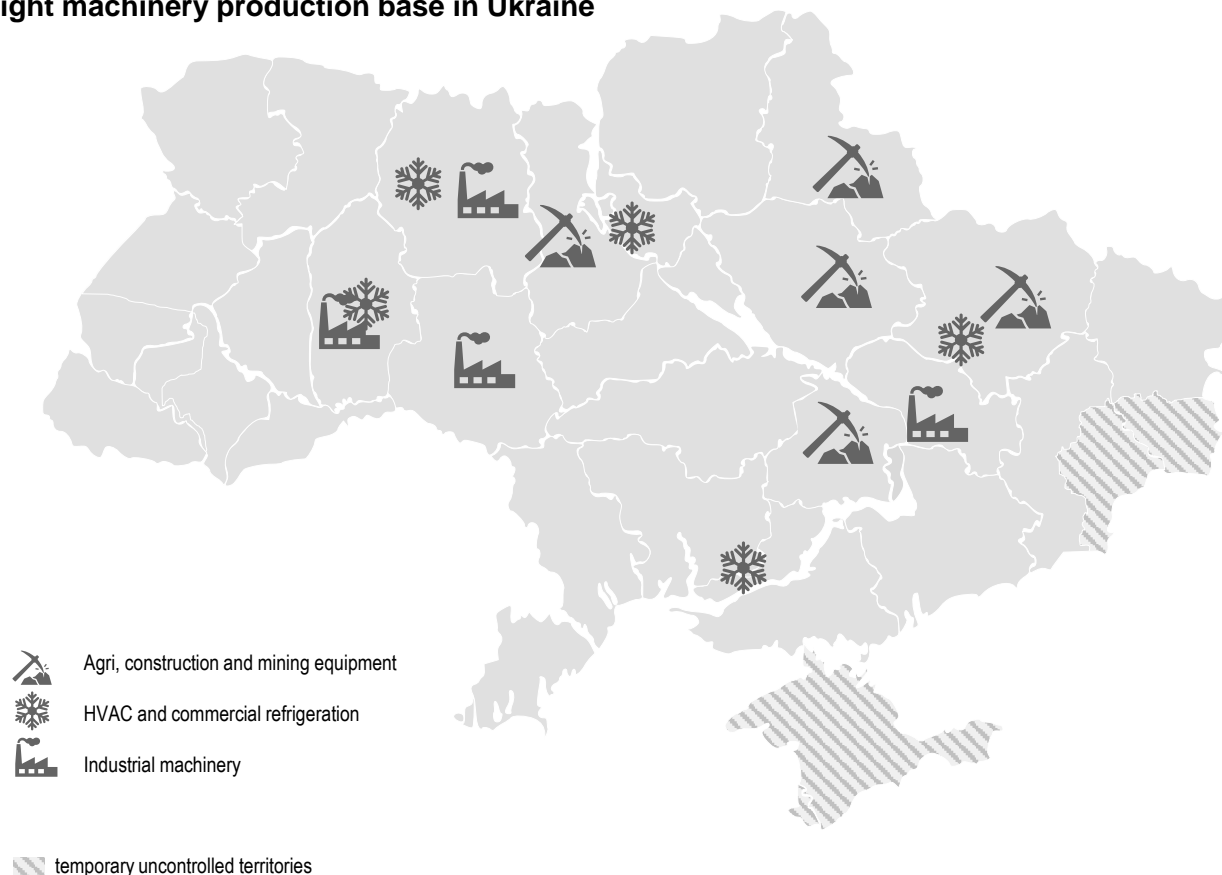




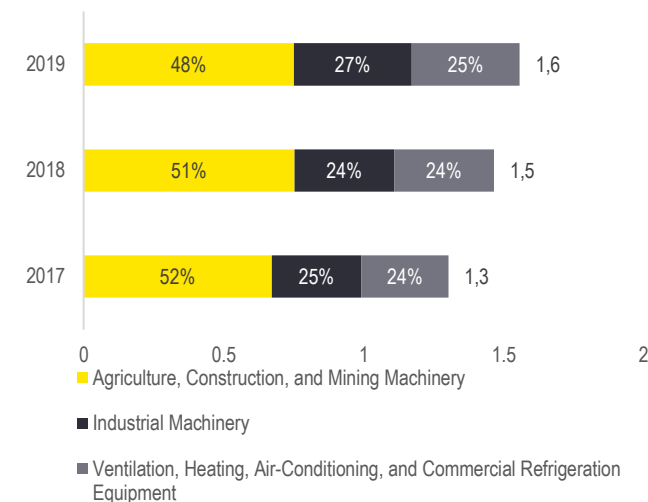
2.4.3.1. Engineering. Light machinery

Sales of industrial machinery and HVAC equipment is increasing

Light machinery production base in Ukraine



Subsector sales, USD b



Source: State Statistical Service of Ukraine

Note. The discrepancy between sales and export volumes we attribute to the facts that (1) Ukrainian NACEs are assigned based on company's main economic activity, which does not necessarily reflect its export-oriented production; (2) tolling schemes: only production costs are counted towards sales, but not raw materials costs, whereas total costs are counted towards export volumes.

The largest production facilities for light machinery are located in the Eastern and Northern regions.

The sector is represented by both soviet-legacy assembly plants (Sloviansk, Kharkiv, etc.) as well as FDI companies (OTIS, Konecranes, etc.). Mining machinery plants have often been integrated into domestic corporations such as DTEK or Metinvest.

Sales of all the segments were increasing during 2017-2019.

CORUM GROUP



УКРАЇНОЗАПЧАСТИНА



Ventservice



OTIS

ELVORTI

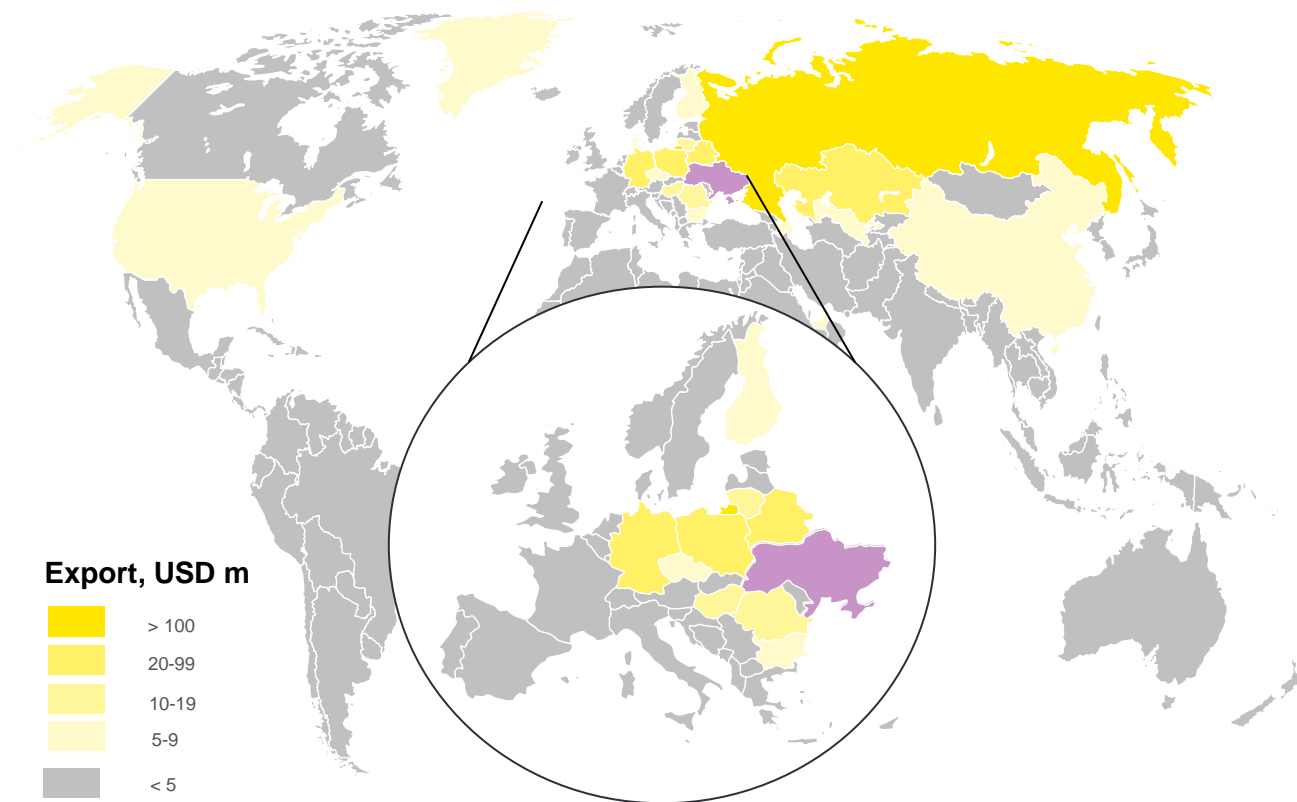


СЛАВЯНСКИЙ
МАШИНОСТРОИТЕЛЬНЫЙ
ЗАВОД



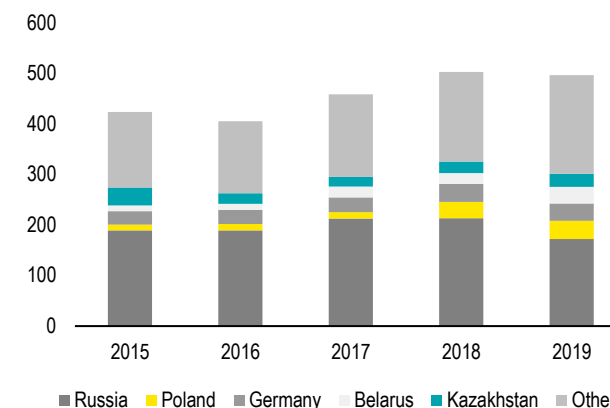
2.4.3.1. Engineering. Light machinery

Russia remains the main export partner...



Over the years, Russia keeps being the primary market for Ukrainian light machinery, for all the segments analyzed (USD 172 m export value in 2019). However, Ukraine loses its position in Russia: from 45% in 2015 to 35% as a share of subsector export in 2019. Poland, Belarus, and Germany are gradually becoming the markets with a higher export share for Ukrainian goods. In 2019, each of the countries imported ca. USD 35 m of Ukraine's light machinery.

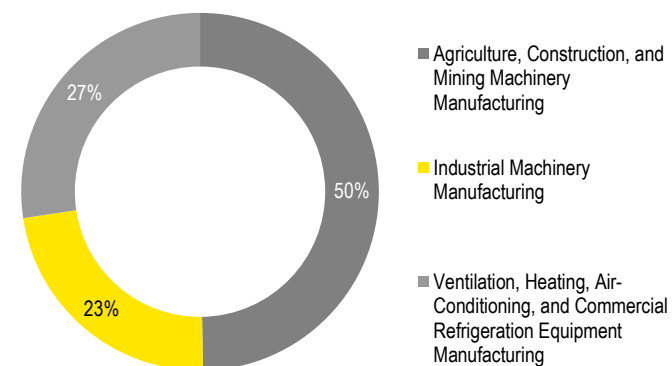
Export by country, USD m



Source: State Statistical Service of Ukraine

Note. The discrepancy between sales and export volumes we attribute to the facts that (1) Ukrainian NACEs are assigned based on company's main economic activity, which does not necessarily reflect its export-oriented production; (2) tolling schemes: only production costs are counted towards sales, but not raw materials costs, whereas total costs are counted towards export volumes.

Export structure by subsector in 2019, USD m



Source: ITC Trademap



2.4.3.1. Engineering. Light machinery

...But Russia's share decreased comparing to the pre-crisis levels

Historically the sector of light machinery was integrated into value chains with Russia.

Comparing the periods of 2010-2013 and 2015-2018 (bearing in mind that 2014 was the year of active military actions), one can make the following conclusions:

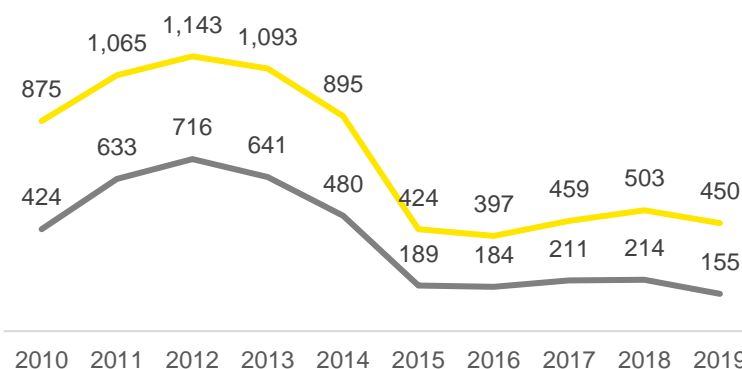
- Ukraine is still dependent on Russia in terms of heavy machinery export, and since 2015, when some Ukrainian producers lost Russian market, export volumes declined twofold;
- The structure of light machinery export to Russia remains unchanged: agriculture, construction, and mining being the largest segments;
- Export value to Russia is slightly growing since 2015 in all the segments but has not reached the pre-crisis levels;
- Export to EU-28 more or less recovered to pre-crisis levels.

Average annual export volume, Ukraine to Russia, USD m

Segment	2011	2012	2013	2014	2015	2016	2017	2018	2019*
Agriculture, Construction, and Mining Machinery	313.1	318.1	286.1	195	92.6	88.5	118	119	91.5
Industrial Machinery	65.5	79.8	93.5	59.7	24.7	28.6	36.7	39.2	25.7
HVAC and Commercial Refrigeration Equipment	254.8	318.1	261.7	224.8	72.1	66.9	56.1	55.5	37.8
Total	633.3	716	641.3	479.5	189.3	184	210.8	213.6	155.1

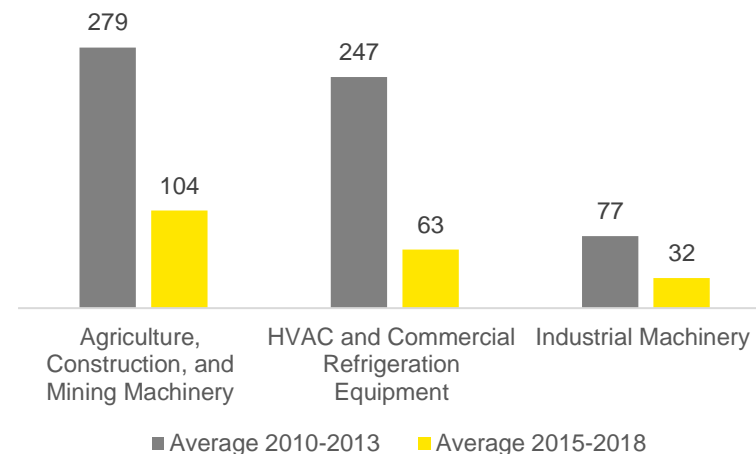
Source: ITC Trademap (2010-2018; Total export 2019); *State Statistical Service of Ukraine (Export to Russia 2019)

Exports to Russia dynamics, USD m



Source: ITC Trademap (2010-2018; Total export 2019); *State Statistical Service of Ukraine (Export to Russia 2019)

Average annual export volumes, Ukraine to Russia, USD m

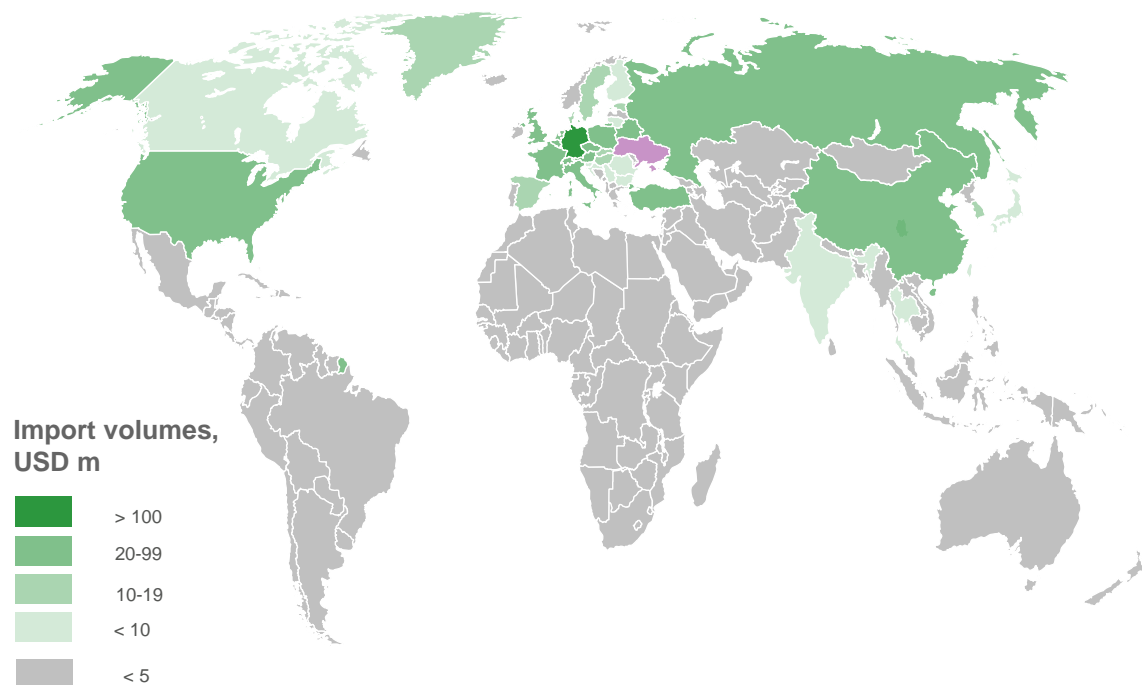


Source: ITC Trademap



2.4.3.1. Engineering. Light machinery

Ukraine's largest imported goods are sophisticated ones, their main suppliers being EU countries








Total Ukrainian import of light machinery comprises USD 2.7 b.

Many machinery products are imported from the EU, including agricultural and construction machinery. For example, all the main suppliers of tractors are EU members, while harvesters are also imported from Germany, Belgium, and the US.

There is a high growth potential for agricultural and construction machinery. The reasons for such expectations are the Great building program that has been launched and the land market opening, which might increase the capital expenditures in agricultural production. Therefore, localization of manufacturing of parts of such machinery (and assembling lines afterwards) can be considered to satisfy both local and foreign demand.

Among other products with large import volumes, there is proven demand in the EU for machinery and apparatus for filtering or purifying gases (Ukraine already producing and exporting parts of such machines).

TOP-5 largest from imported goods

	Road tractors for semi-trailers	Suppliers
	Volume in 2019 : USD 254.1 m CAGR 2015-2019: 45%	Netherlands – 28% Poland – 23% Germany – 21%
	Combine harvester-threshers	Suppliers
	Volume in 2019 : USD 166.1 m CAGR 2015-2019: 12%	Germany – 47% Belgium – 25% USA – 13%
	Combined refrigerator-freezers, with separate external doors	Suppliers
	Volume in 2019 : USD 119.6 m CAGR 2015-2019: 13%	Poland – 30% Russia – 15% China – 14%
	Boring and sinking machinery (not self-propelled)	Suppliers
	Volume in 2019 : USD 104.8 m CAGR 2015-2019: 226%	China – 57% Germany – 42% USA – 1%
	Machines and mechanical appliances, n.e.s.	Suppliers
	Volume in 2019 : USD 90 m CAGR 2015-2019: 24%	Germany – 27% China – 18% Italy – 15%

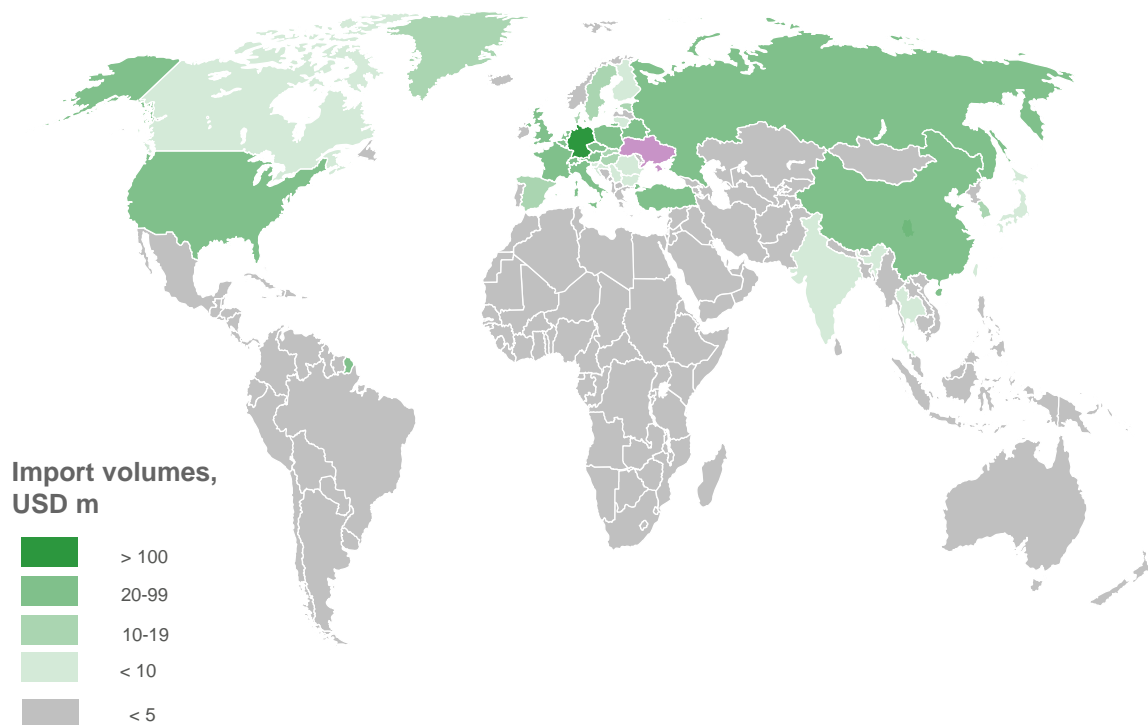
Source: ITC Trademap

Note: Tractors, of an engine power > 130 kW (volume in 2019 USD 217.2 m) are not included in the list, as they were not imported at all during 2015-2018



2.4.3.1. Engineering. Light machinery

Among the fastest-growing imported goods, parts of industrial, mining and agricultural machinery prevail



The total light machinery import was growing at 26% CAGR in 2015-2019, but the import of some goods was increasing at a faster pace. These markets could also be rising domestically as the imports growth may indicate high domestic demand.

Namely, these are boring and sinking machines and their parts, mainly imported from China (machines are also among the largest imported products) and self-propelled front-end shovel loaders and various parts of agricultural and industrial machinery (Estonia and Switzerland are the main suppliers, indicating a possibly high level of sophistication).

TOP-5 fastest-growing from TOP-30 largest imported goods

	Boring and sinking machinery (not self-propelled)	Suppliers
	Volume in 2019 : USD 104.8 m CAGR 2015-2019: 226%	China – 57% Germany – 42% USA – 1%
	Parts for boring or sinking machinery	Suppliers
	Volume in 2019 : USD 72.8 m CAGR 2015-2019: 101%	China – 61% USA – 11% Germany – 11%
	Parts of industrial machines and mechanical appliances, n.e.s.	Suppliers
	Volume in 2019 : USD 39.7 m CAGR 2015-2019: 75%	Switzerland – 44% Germany – 22% China – 5%
	Parts of agricultural machinery	Suppliers
	Volume in 2019 : USD 82.8 m CAGR 2015-2019: 63%	Estonia – 58% China – 10% Russia – 5%
	Self-propelled front-end shovel loaders	Suppliers
	Volume in 2019 : USD 73.9 m CAGR 2015-2019: 58%	China – 41% USA – 18% Sweden – 9%

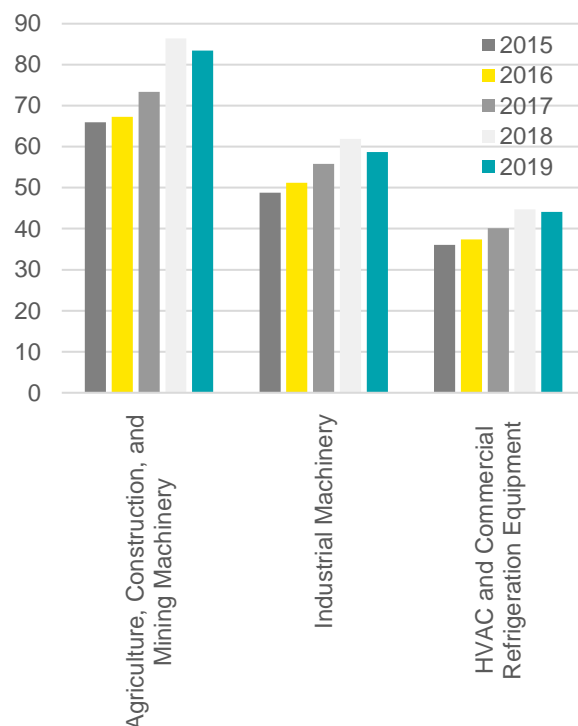
Source: ITC Trademap



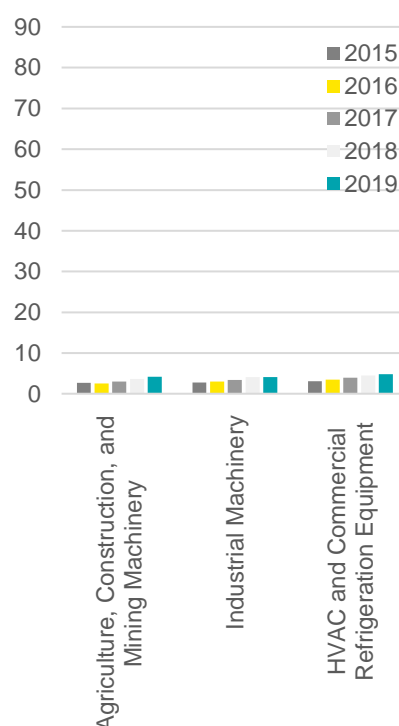
2.4.3.1. Engineering. Light machinery

Near-shoring trend may be favorable for manufacturing goods with high Chinese share in the EU import






EU 28 imports from the world, USD b



EU 28 imports from China, USD b



TOP-5 goods with the largest share of China's imports among the TOP-30 goods by volume imported by EU from China

	Drills of all kinds for working in hand, with self-contained electric motor	China's share
	Import from world in 19Q3 – 20Q2 : USD 2,5 b	Share – 45% Volume 19Q3 – 20Q2: USD 1,1 b
	Saws for working in the hand, with self-contained electric motor	China's share
	Import from world in 19Q3 – 20Q2 : USD 1.1 b	Share – 44% Volume 19Q3 – 20Q2 : USD 474 m
	Air conditioning machines incorporating a refrigerating unit but without a valve for reversal	China's share
	Import from world in 19Q3 – 20Q2 : USD 1.5 b	Share – 37% Volume 19Q3 – 20Q2 : USD 531.5 m
	Electromechanical tools for working in the hand, with self-contained electric motor	China's share
	Import from world in 19Q3 – 20Q2 : USD 4 b	Share – 34% Volume 19Q3 – 20Q2 : USD 1,4 b
	Sawing machines for working wood, cork, bone, hard rubber, hard plastics or similar hard materials	China's share
	Import from world in 19Q3 – 20Q2 : USD 763.8 m	Share – 34% Volume 19Q3 – 20Q2 : USD 242.5 m

In general, China is not the monopolistic provider of light machinery to the EU. However, China's imports of drills and saws for working in hand (either industrial or consumer) constitute almost half of all EU-28 imports. Industrial air-conditioners, electromechanical tools and sewing machines for various materials are other examples of products with sizeable Chinese share in EU-28 imports.

In case the near-shoring trend is in place, competing for the production of goods with a high Chinese share in EU import might be possible for Ukraine, bearing in mind broad production base that is now partly not in use after the loss of Russian market.

Other general purpose machinery segment is included to the *heavy machinery* subsector and its main product group is lifting and handling equipment; however, there are also such products as packaging equipment, tools for working in hand etc. that are more relevant for light machinery.

2.4.3.1. Engineering. Light machinery

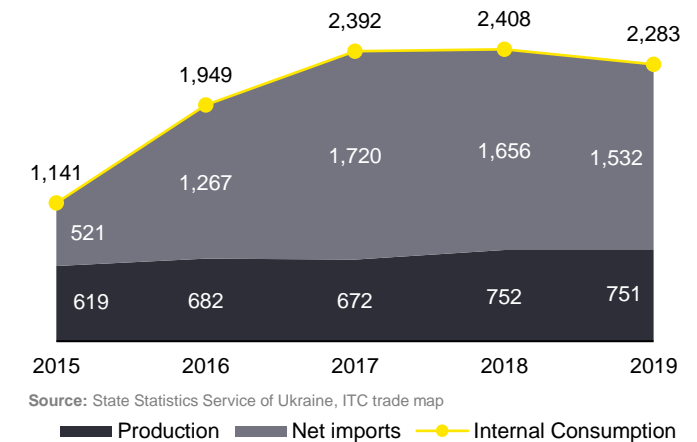
Agriculture, Construction and Mining Machinery: need for constant supply of parts for agricultural and construction machinery

Over the past five years, Ukraine has had more than 30 thousand people employed in the manufacturing of agriculture, mining, and construction machinery. Ukraine's machinery export is traditionally dependent on the market of CIS countries (export to Russia, Belarus, and Kazakhstan was 48.5% of export in 2019). Export of machinery for working with stones and other minerals (HS 8474) follows an upward trend and in 2019 was 54% of the subsector's export. However, we already found a niche in export to Germany and Poland, namely machinery and its parts of sorting, grinding, and mixing of earth, stone, ores, or other mineral substances.

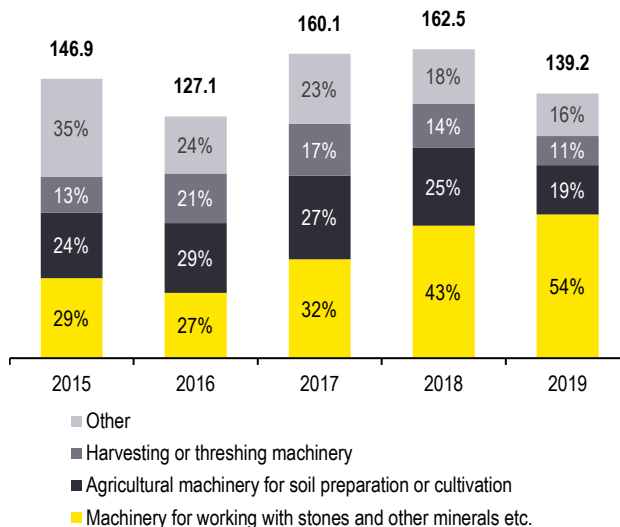
While Ukrainian export of machinery remained at the same level over 2015-2019, import grew significantly in 2016 and was declining slightly afterwards, resulting in USD 1,671 m in 2019 (approx. 408 m items). However, we do not foresee a sharp decline in domestic demand in the near future. The main drivers of import are construction equipment (bulldozers, angledozers, graders, etc.) and tractors due to the growth of the agriculture industry and rebuilding infrastructure in Ukrainian regions thanks to decentralization progress.

Among the suppliers of imported goods are EU countries (Germany, Poland, and the Netherlands), although China and the U.S. are also among the main import partners. That is due to the high level of sophistication of goods imported. Such an amount of machinery needs a constant supply of parts. Ukraine has experience in parts production for automotive, so there is a decent potential for FDI in this sector.

Subsector size, USD m



Key export products, 2019 USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

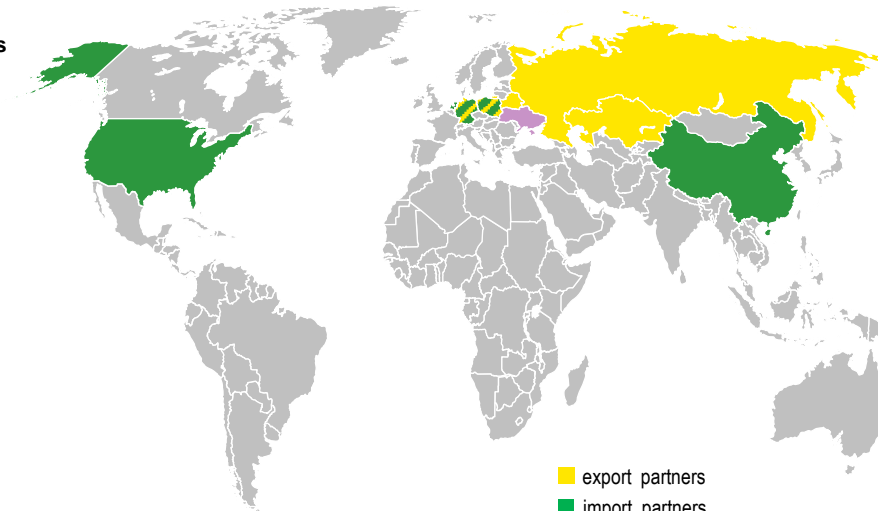
TOP Export Partners

Russia
Export: USD 91.5 m
CAGR -0.3%

Germany
Export: USD 27.4 m
CAGR 8.4%

Belarus
Export: USD 17.8 m
CAGR 51%

World Total
Export: USD 139.2 m
CAGR -1.4%



TOP Import Partners

Germany
Import: USD 423.4 m
CAGR 23.4%

China
Import: USD 328.8 m
CAGR 67.3%

U.S.
Import: USD 240.4 m
CAGR 19.2%

World Total
Import: USD 1,671.3 m
CAGR 25.8%

Note: due to statistical discrepancies, we use data on total foreign trade from ITC Trademap



2.4.3.1. Engineering. Light machinery

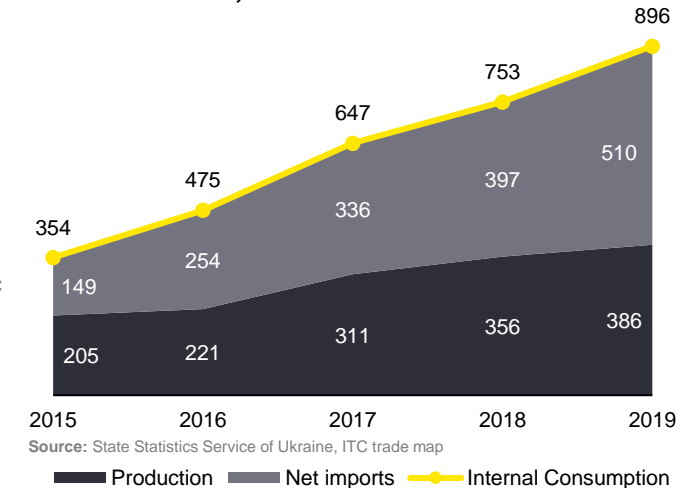
Heating, Ventilation, Air-Conditioning (HVAC) and Commercial Refrigeration Equipment Manufacturing: half of export volume goes to Russia

Ukraine has a broad production base for ventilation, heat, and air conditioning equipment manufacturing. Over 2015-2019, the number of employees increased. The subsector of HVAC main products are machinery for laboratory equipment, parts of industrial refrigerators, and parts of central-heating boilers. The export of these products increased in recent years.

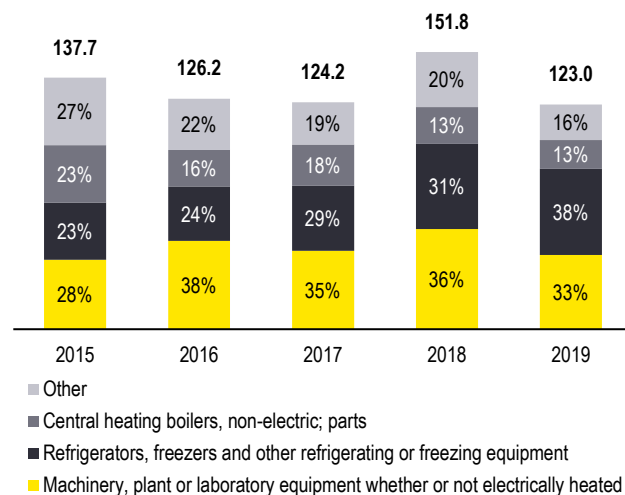
Although almost half of the products are exported to Russia, Ukrainian companies export specialized furniture (chests, cabinets, display counters, show-cases for storage and display) to the EU, namely to Poland and Slovakia.

While Ukrainian export in the subsector remains stable at the level of 125-150 USD m, import volumes doubled from USD 287 m to USD 633 m (100,038 thousand items) between 2015 and 2019. It indicates strong domestic demand and, combined with demand from the EU, for some products, the potential for FDI in assembling is possible.

Subsector size, USD m



Key export products, 2019 USD m



Key trade partners in 2019, CAGR 2015-2019

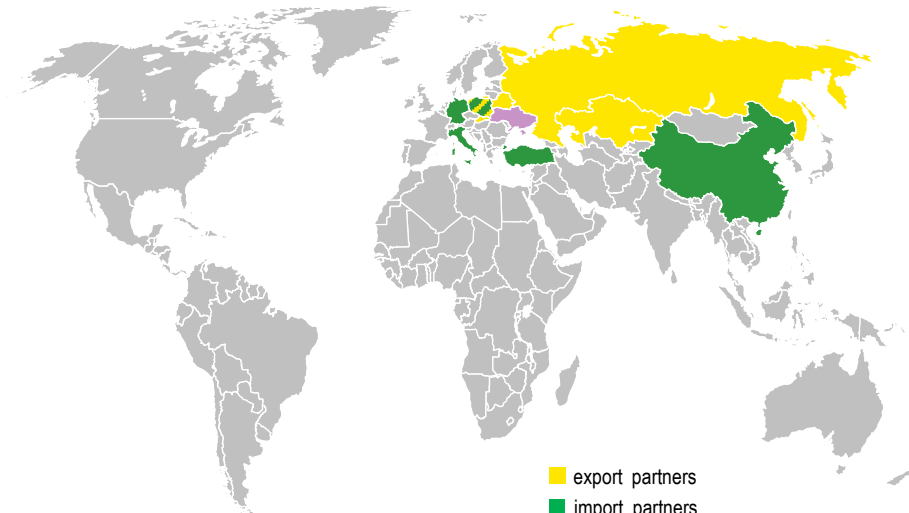
TOP Export Partners

Russia
Export: \$55.1 m
CAGR -6.5%

Slovakia
Export: \$12.2 m
CAGR 22.5%

Poland
Export: \$11.7 m
CAGR 61.3%

World Total
Export: \$123 m
CAGR -2.8%



TOP Import Partners

Poland
Import: \$98.5 m
CAGR 25.2%

China
Import: \$81.6 m
CAGR 47.1%

Italy
Import: \$67.9 m
CAGR 18.9%

World Total
Import: \$632.9 m
CAGR 21.9%

Note: due to statistical discrepancies, we use data on total foreign trade from ITC Trademap

Source: State Statistics Service of Ukraine



2.4.3.1. Engineering. Light machinery

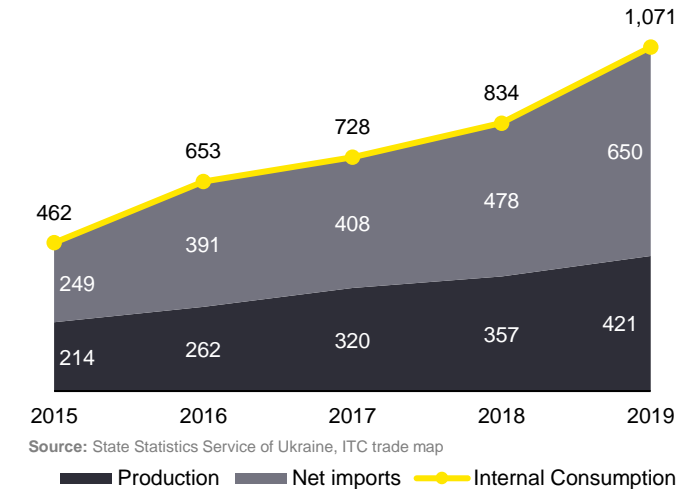
Industrial Machinery Manufacturing: stable growth of production base, EU countries supply most of the imported products

Industrial machinery manufacturing is highly dependent on the relevant industries' dynamics. In the world, trade grows at the fastest pace of machinery for papermaking, tools for working with plastic and minerals. Among those fastest-growing products, in 2019, Ukraine ranked 27th in world export of HS8437 machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables.

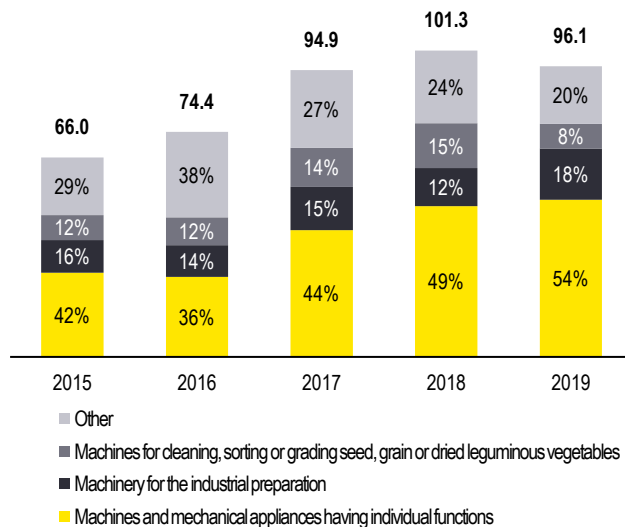
Import volumes are considerably higher than export: \$700 m or 60,498 ths items vs \$96.1 m or 16,781 ths items; furthermore, over the last five years, they are growing at a faster pace (over 2015-2019, import CAGR 20.6% vs export CAGR 7.6%). Notably, Ukraine imports considerable volumes of industrial machinery from countries untypical for other subsectors, such as Switzerland and Italy. From Switzerland, roughly 2/3 of the volume in 2019 were *Presses for manufacturing particle board or fiber building board of wood or other ligneous materials*.

The leading players are Berdychev machine-building plant "Progress", Spectekhosnastka (plastic package). As for FDI companies, Mann+Hummel Filtration Technology Ukraine was established in 2005. Considering the position of net importer and proximity of the current supplying countries (Poland, Germany, Italy), manufacturers of parts of industrial machinery might be attracted.

Subsector size



Key export products, 2019 USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Russia

Export: \$25.7 m
CAGR 1.1%

Poland

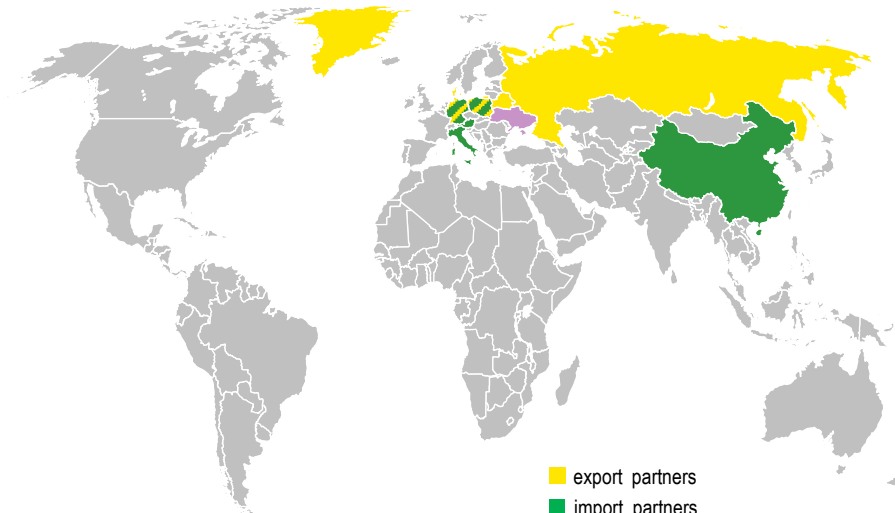
Export: \$11.25 m
CAGR 52.6%

Belarus

Export: \$6.3 m
CAGR 23.8%

World Total

Export: \$96.1 m
CAGR 9.9%



TOP Import Partners

Germany

Import: \$146.8 m
CAGR 6.0%

Italy

Import: \$119.7 m
CAGR 35.2%

Switzerland

Import: \$97.9 m
CAGR 79.6%

World Total

Import: \$746.6 m
CAGR 24.1%

Note: due to statistical discrepancies, we use data on total foreign trade from ITC Trademap

Source: State Statistics Service of Ukraine | National Strategy to Increase Foreign Direct Investment in Ukraine | Section 2.4: Advanced Manufacturing | Page 50 of 137



2.4.3.1. Engineering. Light machinery

Top companies

Legacy

There are quite a few large industrial enterprises that were founded in the independence years, based on assets built decades ago - some of those with more than a century of history.

In most cases, new owners preferred to build their wealth by exploiting the existing production base. This created a problem in the long run since after the country became open to worldwide competition, some assets could not bar the competition. The issue developed even to more extent with the loss of the Russian market.

Svitlo shakhtaria

One of the oldest machine building enterprises in Ukraine. It was founded in 1891 in Kharkiv. One of the largest coal mining equipment producers in the world. Once, it made half of conveyors used in coal mines in the whole USSR.



Segment – mining equipment



Ownership – Corum Group (a part of DTEK)



Revenues – USD 52 m in 2019, CAGR in 2015-2019 is 4%

Vertical integration

During both early privatization and consequent redistribution of ownership, Ukrainian businessmen tended to build vertically integrated holdings in order to control the whole value chains.

Examples include machinery production as well. For example, Metinvest acquired major producers of mining equipment and metalworking equipment. Ukrprominvest, whose primary business was agriculture and food processing, started to produce agricultural equipment. The opposite example is the UBC Group, which founded restaurants in 2005, while their primary business was production equipment.

Ukpostach

The enterprise is part of UBC Group that makes various equipment for food processing and restaurants, including refrigerators and furniture, provides services such as installation and maintenance, and even owns a network of beer restaurants. The group is based in Kharkiv.



Subsector – commercial refrigerators



Ownership – local investors, blocking belongs to the EBRD



Revenues – USD 48 m in 2019, CAGR in 2015-2019 is -12%

Clustering

Building clusters are considered good practice in spatial industrial organization. Enterprises can benefit from sharing infrastructure and save on logistics between each other.

For example, the Kharkiv machine building cluster was the largest in the Soviet Union and now is one of the largest in Ukraine. The cluster consists of five industrial zones, each occupying 500-1000 hectares. Its enterprises produce engines, turbines, generators, locomotives, tractors, and other agricultural equipment, tanks, planes, bicycles, cables, and also a lot of other, not machine related products.

Ukravtozapchastyna

Initially created as a trader responsible for spare part logistics for the automotive branch of Ukrprominvest group, the enterprise eventually started to manufacture equipment for agriculture and forestry. It was founded in 1995 in Kyiv.



Segment – agricultural equipment



Ownership – Ukrprominvest



Revenues – USD 45 m in 2019, CAGR in 2015-2019 is -13%

2.4.3.2. Engineering. Heavy machinery

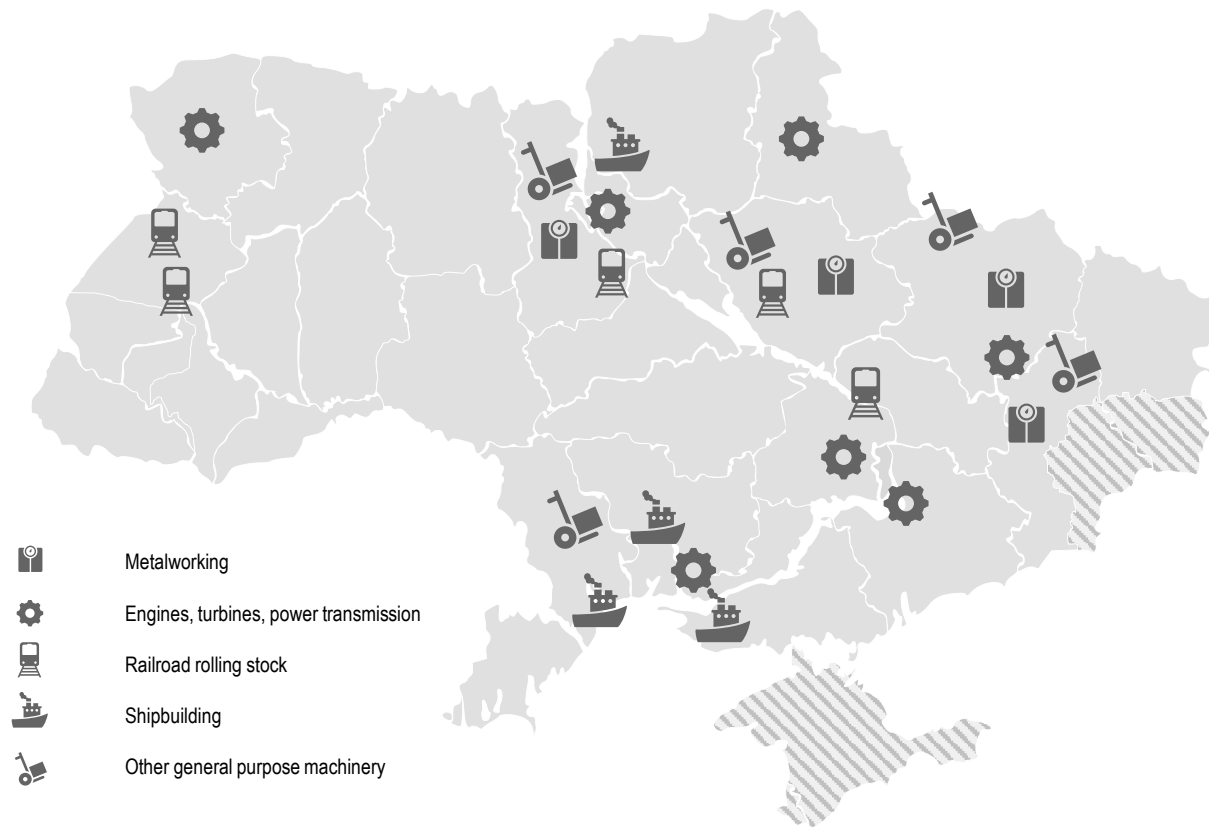




2.4.3.2. Engineering. Heavy machinery

Excessive decades-old facilities became a burden for companies after a forced change in market focus

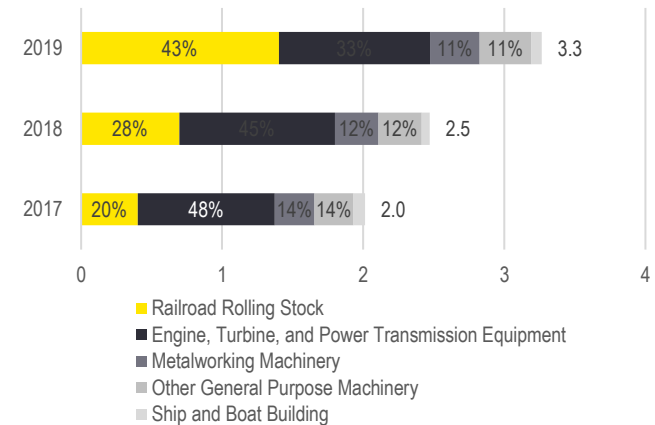
Heavy machinery production base in Ukraine



temporary uncontrolled territories



Subsector sales, USD b



Source: State Statistical Service of Ukraine

Note. Other General Purpose Machinery: revenue on NACE 28.24 for 2019 is confidential and not available. The discrepancy between sales and export volumes we attribute to the facts that (1) Ukrainian NACEs are assigned based on company's main economic activity, which does not necessarily reflect its export-oriented production; (2) tolling schemes: only production costs are counted towards sales, but not raw materials costs, whereas total costs are counted towards export volumes.

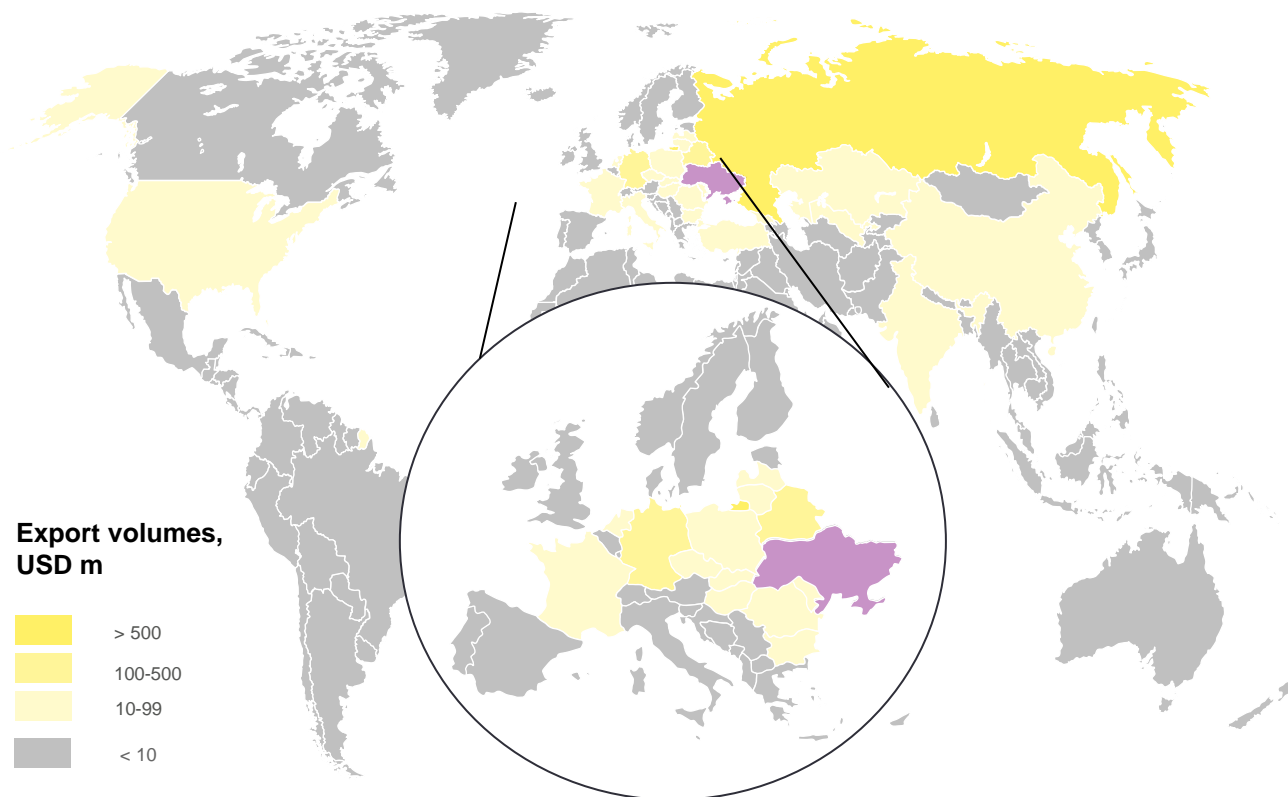
Heavy machinery manufacturing in Ukraine is mostly represented by the factories with excessive manufacturing facilities that turned into a burden after the USSR collapsed. For example, the Ukrainian engine, turbine production were projected to cover the whole USSR needs, and demand for their products was usually driven by military funding.

However, Ukraine still has production bases that are utilized by neighboring countries. And while their products will unlikely be attractive for developed countries due to outdated technologies, extensive production bases, and, what is more important, experienced staff may attract interest from strategic investors.



2.4.3.2. Engineering. Heavy machinery

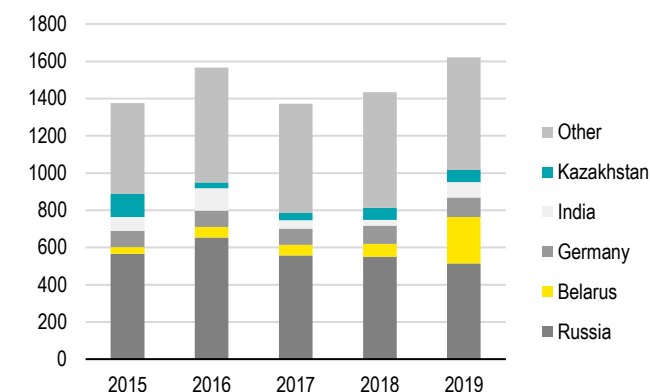
Export of heavy machinery is driven by state-owned engine and turbine manufacturers



Ukrainian heavy machinery export is driven by export of industrial turbines and engines from large state-owned companies like Elektrovazhmash or Turboatom. The leading export partner is Russia, which is the destination of roughly 1/3 of the products. Export to Russia is mostly represented by replacement of Ukrainian equipment at power plants where a change of producers is unlikely due to safety reasons. Ukraine is well-equipped to supply cargo railroad rolling stock to the ex-USSR markets. For example, in 2019 ca. 1750 cargo wagons were exported to Belarus, providing for a sharp growth of this country's share in Ukrainian heavy machinery export volume.

As for exporting to the EU and other large foreign markets, Ukrainian producers are limited due to the non-availability of certificates required, weak technology development and natural protectionism of other countries. However, the Interpipe's example, that developed a 1688mm width wheel pairs for Spain showed that EU markets might be opened.

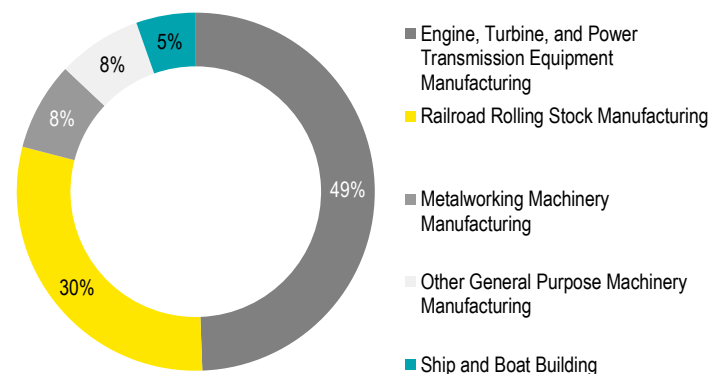
Export by country, USD m



Source: State Statistical Service of Ukraine

Note. The discrepancy between sales and export volumes we attribute to the facts that (1) Ukrainian NACEs are assigned based on company's main economic activity, which does not necessarily reflect its export-oriented production; (2) tolling schemes: only production costs are counted towards sales, but not raw materials costs, whereas total costs are counted towards export volumes.

Export structure by subsector in 2019, USD m



Source: ITC Trademap

2.4.3.2. Engineering. Heavy machinery

Lost of the Russian market changed the structure of the heavy machinery export and let to the stagnation

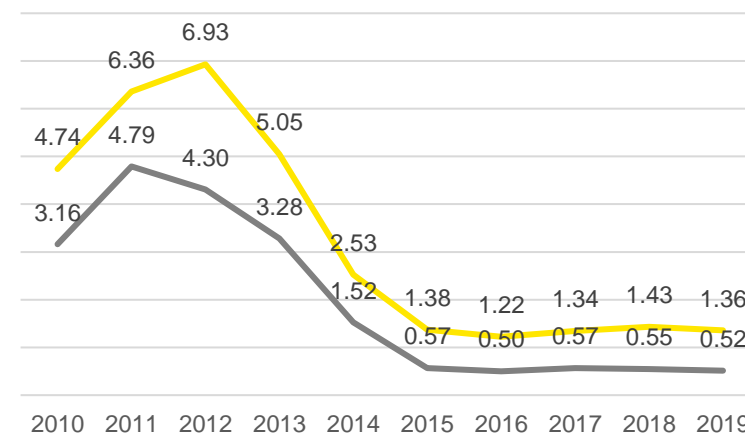
Historically the sector of heavy machinery was integrated into value chains with Russia.

Comparing the periods of 2010-2013 and 2015-2018 (bearing in mind that 2014 was the year of active military actions), one can make the following conclusions:

Ukraine is still dependent on Russia in terms of heavy machinery export, and since 2015, when Ukrainian producers lost the Russian market, the industry is stagnating.

- The structure of heavy machinery export to Russia has changed: *engines, turbines, and power transmission equipment* is now the largest segment in terms of export volumes, instead of railroad stock, as it was in 2010-2013. It was caused, among other factors, by the loss of Luhanskteplovoy – a Russian company's subsidiary located at the occupied territory of Luhansk oblast.
- While the export volumes of the two largest segments do not tend to return to pre-crisis levels, two smaller segments (metalworking machinery and ship and boat building) are re-orienting to other trade partners, mainly the EU countries. Export value to Russia has been more or less stable since 2015 in all the segments.

Exports to Russia dynamics, USD b



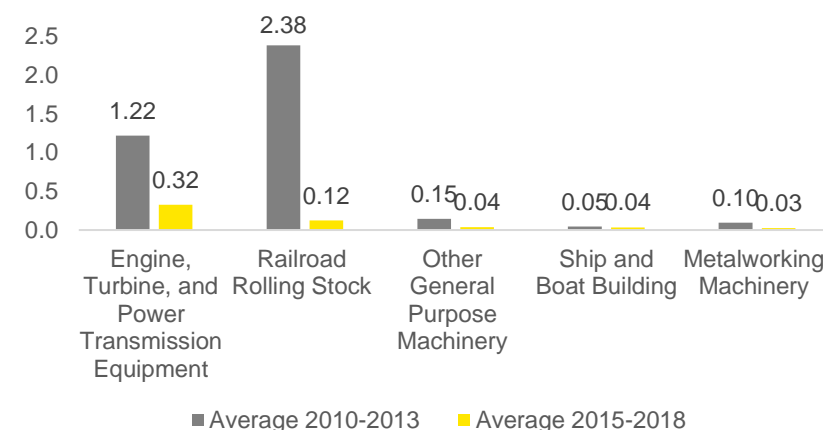
Source: ITC Trademap (2010-2018; Total export 2019); *State Statistical Service of Ukraine (Export to Russia 2019)

Average annual export volume, Ukraine to Russia, USD m

Segment	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
Engine, Turbine, and Power Transmission Equipment	940	1,321	1,362	1,246	807	369	299	320	311	219
Railroad Rolling Stock	1,945	3,194	2,636	1,743	601	110	112	150	121	189
Other General Purpose Machinery	110	170	140	162	60	31	36	38	50	47
Ship and Boat Building	29	16	89	48	4	33	39	32	38	19
Metalworking Machinery	137	91	79	81	51	23	18	30	30	41
Total	3,161	4,793	4,305	3,281	1,524	566	504	570	551	515

Source: ITC Trademap (2010-2018; Total export 2019); *State Statistical Service of Ukraine (Export to Russia 2019)

Average annual export volumes, Ukraine to Russia, USD b

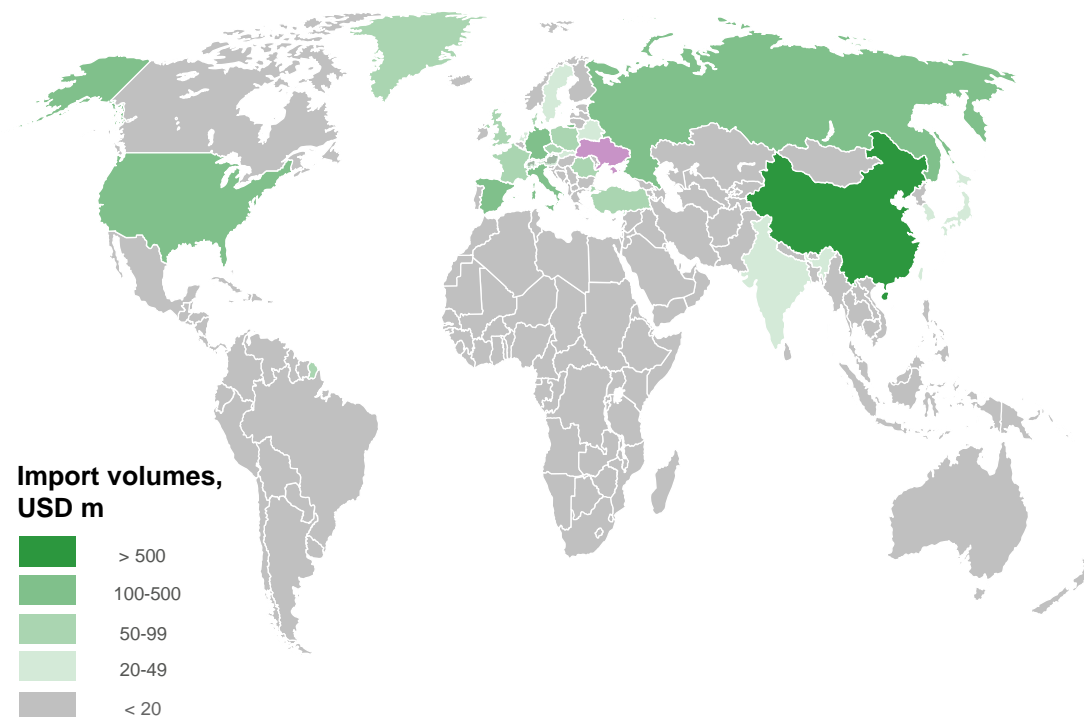


Source: ITC Trademap



2.4.3.2. Engineering. Heavy machinery

China is the main import partner for heavy machinery, followed by the EU



Total Ukrainian imports of heavy machinery comprise USD 3.1 b. From the TOP-5 imported goods by volume (most of which are from engine, turbine, and power transmission manufacturing subsector), the localization might be considered for appliances for pipes, static converters, and other goods that have a high potential for export to the EU countries.

In addition, localization might be possible for axles and wheels of railway rolling stock and assembling rolling stock and locomotives – only if there is constant domestic demand for the replacement of or additional railway and tramway wagons both in Ukraine and neighbouring countries.

Opportunities for localization may be in the inclusion of Ukrainian companies into the value chains of global machinery manufacturers.

TOP-5 largest from imported goods

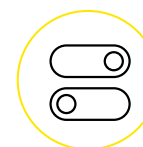


Appliances for pipes, boiler shells, tanks, vats or the like

Volume in 2019 :
USD 233.3 m
CAGR 2015-2019:
29%

Suppliers

China – 37%
Germany – 10%
Italy – 9%



Static converters

Volume in 2019 :
USD 227.7 m
CAGR 2015-2019:
43%

Suppliers

China – 65%
Germany – 6%
Italy – 4%



Generating sets, wind-powered

Volume in 2019 :
USD 150.5 m
CAGR 2015-2019:
1870%

Suppliers

Spain – 33%
Germany – 22%
China – 20%



Parts of non-electrical engines and motors, n.e.s.

Volume in 2019 :
USD 97.3 m
CAGR 2015-2019:
115%

Suppliers

Spain – 17%
Canada – 16%
U. S. – 14%



Centrifugal pumps, power-driven

Volume in 2019 :
USD 72 m
CAGR 2015-2019:
11%

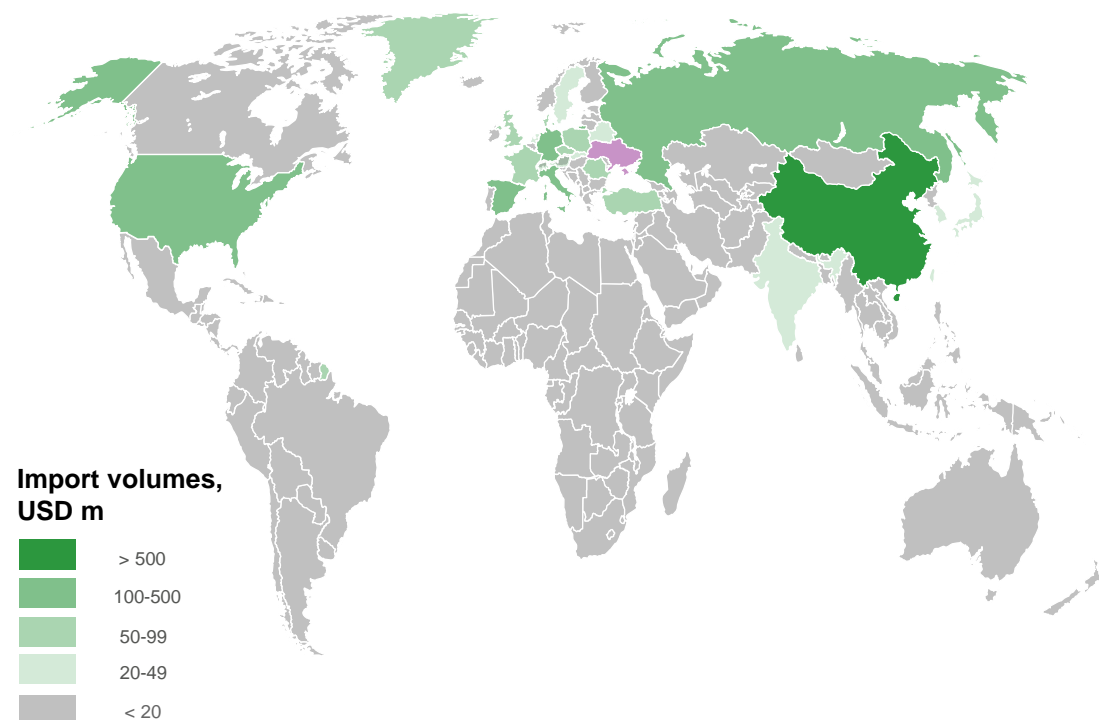
Suppliers

China – 31%
Germany – 15%
Italy – 14%



2.4.3.2. Engineering. Heavy machinery

Growth of import of heavy machinery was driven by attractive renewable energy tariffs



The total import of heavy machinery was growing at 22% CAGR in 2015-2019. However, it was mainly due to one-offs. For example, the import of renewable equipment (wind-powered generating sets and parts) was growing due to the attractive renewable energy generation tariffs.

TOP-5 fastest growing from TOP-30 largest imported goods

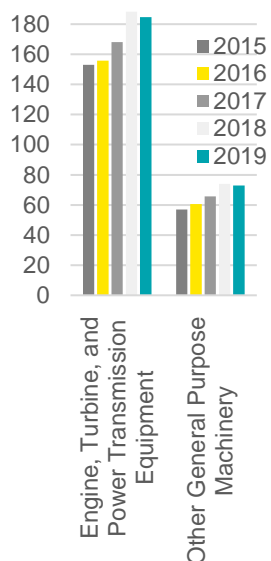
	Generating sets, wind-powered	Suppliers
	Volume in 2019 : USD 150.5 m CAGR 2015-2019: 1870%	Spain – 33% Germany – 22% China – 20%
	Parts of non-electrical engines and motors, n.e.s.	Suppliers
	Volume in 2019 : USD 97.3 m CAGR 2015-2019: 115%	Spain – 17% Canada – 16% U. S. – 14%
	Parts to be used with electric motors and generators	Suppliers
	Volume in 2019 : USD 53.6 m CAGR 2015-2019: 101%	China – 74% Germany – 9% Russia – 9%
	Transformers having a power handling capacity > 500 kVA (excl. liquid dielectric transformers)	Suppliers
	Volume in 2019 : USD 17.4 m CAGR 2015-2019: 57%	Italy – 47% Germany – 17% Turkey – 11%
	Parts of valves for pipes, boiler shells, tanks, vats etc.	Suppliers
	Volume in 2019 : USD 27.1 m CAGR 2015-2019: 54%	France – 31% China – 18% Germany – 13%



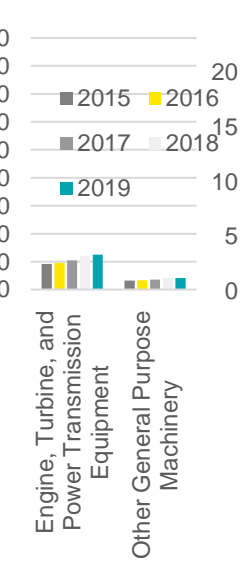
2.4.3.2. Engineering. Heavy machinery

Among TOP heavy machinery goods that EU imports from China, there are some goods with localization potential

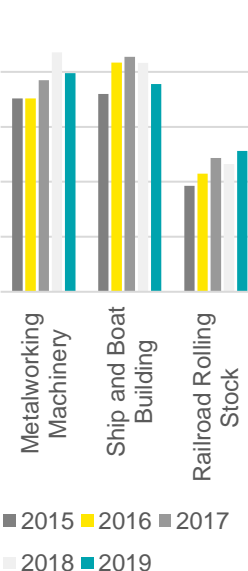
EU-28 imports from world, USD b



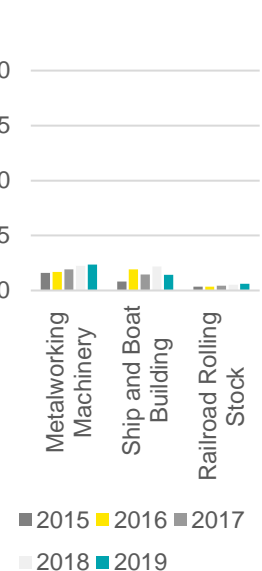
EU-28 imports from China, USD b



EU-28 imports from world, USD b



EU-28 imports from China, USD b



TOP-5 goods with the largest share of China's imports among the TOP-30 goods by volume imported by EU from China

	Permanent magnets of metal Import from world in 19Q3 – 20Q2 : USD 993 m China's share Share – 67% Volume 19Q3 – 20Q2 : USD 661.7 m
	Cargo and cargo-passenger vessels Import from world in 19Q3 – 20Q2 : USD 3.4 b China's share Share – 28% Volume 19Q3 – 20Q2 : USD 910.6 m
	Injection or compression-type moulds for rubber or plastics Import from world in 19Q3 – 20Q2 : USD 3.1 b China's share Share – 33% Volume 19Q3 – 20Q2 : USD 1.02 b
	Static converters Import from world in 19Q3 – 20Q2 : USD 18.5 b China's share Share – 30% Volume 19Q3 – 20Q2 : USD 5.6 b
	Transformers having a power handling capacity <= 1 kVA (excl. liquid dielectric transformers) Import from world in 19Q3 – 20Q2 : USD 1.3 b China's share Share – 30% Volume 19Q3 – 20Q2 : USD 380.6 m

Among heavy machinery, the largest segment in terms of import value is engine, turbine, and power transmission equipment, which constitutes nearly 75% of EU-28 imports of heavy machinery. The other three subsectors (metalworking machinery, railroad rolling stock, and ship and boat building) constitute much lower shares. In all the subsectors, an increase in import volumes has been observed until the Covid-19 restrictions lowered the level of business activity.

Among the goods with the highest Chinese share in EU import, there are both with a decent potential for near-shoring (static converters) and the ones being Chinese niche products (small transformers or permanent magnets). For the former, Ukraine may be capable of competing for near-shoring, as there is an excessive production base, and re-orienting to new markets and products is needed after the loss of the Russian market.

Other general purpose machinery segment is included to the *heavy machinery* subsector and its main product group is lifting and handling equipment; however, there are also such products as packaging equipment, tools for working in hand etc. that are more relevant for light machinery and therefore TOP-5 products here do not include this part of other general purpose machinery.



2.4.3.2. Engineering. Heavy machinery

Engine, turbine and power-transmission equipment: export to Russia decreases, large SOEs are prepared to be privatized

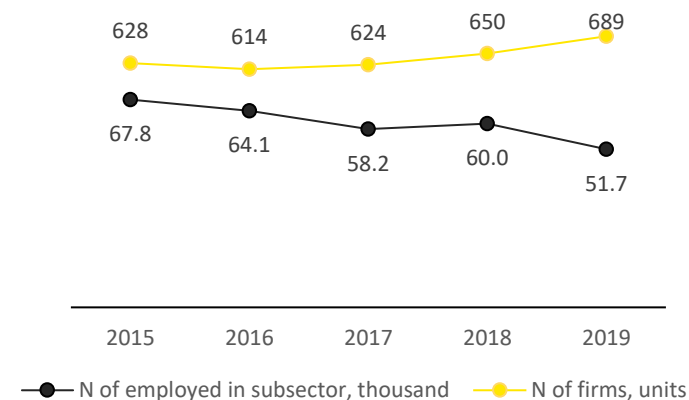
It is the largest subsector in terms of export volume. Ukraine's exports of *8406 Steam turbines and other vapour turbines; parts thereof* represent 0,4% of the world's total.

There is a relatively large share of state-owned enterprises in the subsector. Three major companies are SOEs: Zorya-Mashproekt, Turboatom, and Elektrovazhmash.

Elektrovazhmash market share in 2018 was 7.3% in the field of electrical equipment production in Ukraine. Zorya-Mashproekt Gas Turbine R&D Complex is Ukraine's designer and manufacturer of marine and industrial gas turbine plants (mainly 3-25 mW gas turbine engines). Turboatom is one of the top turbine producers in the world, manufacturing turbines and parts for various power plants. The state owns 75% of the company, the minority share is divided by Svarog Asset Management and Biscione Limited (Cyprus).

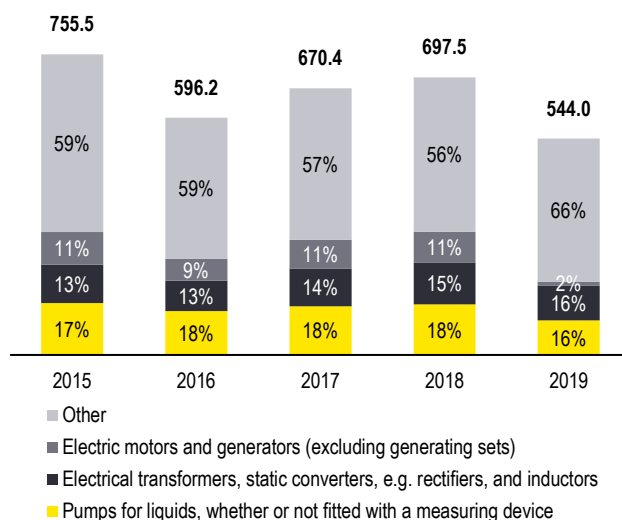
The privatization of Elektrovazhmash and Turboatom is currently being prepared by the State Property Fund.

Subsector size



Source: State Statistics Service of Ukraine

Key export products, 2019 USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

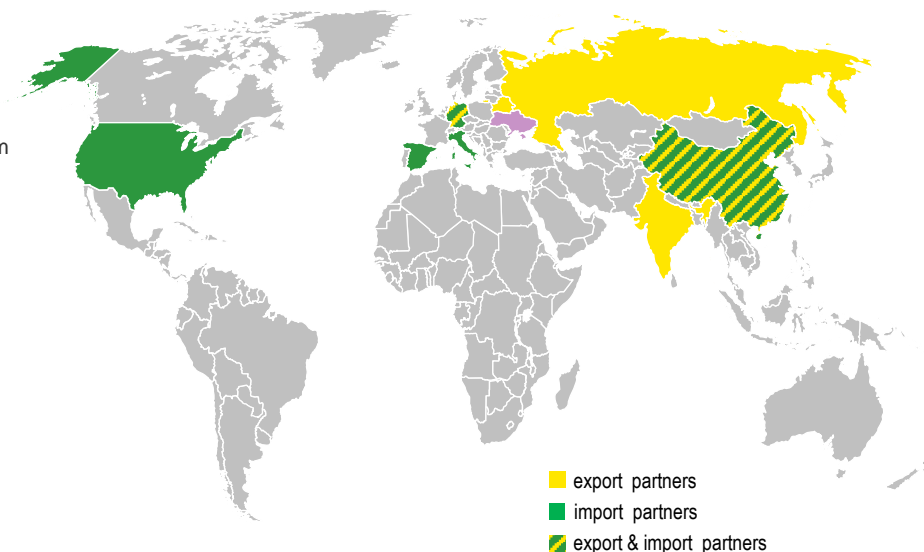
TOP Export Partners

Russia
Export: USD 219.3 m
CAGR -12.2%

Germany
Export: USD 83.6 m
CAGR 2.1%

India
Export: USD 69.5 m
CAGR 0.4%

World Total
Export: USD 544 m
CAGR -7.9%



TOP Import Partners

China
Import: USD 596 m
CAGR 37.9%

Germany
Import : USD 280.7 m
CAGR 27.1%

Italy
Import : USD 147 m
CAGR 19.2%

World Total
Import : USD 1,813 m
CAGR 25.5%

Note: due to statistical discrepancies, we use data on total foreign trade from ITC Trademap

Source: State Statistics Service of Ukraine | National Strategy to Increase Foreign Direct Investment in Ukraine | Section 2.4: Advanced Manufacturing | Page 59 of 137



2.4.3.2. Engineering. Heavy machinery

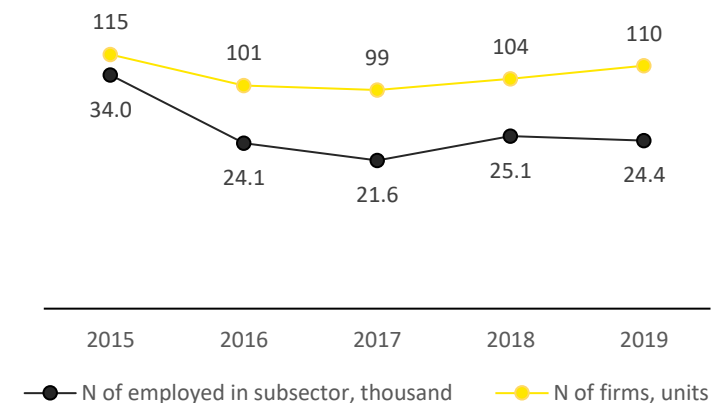
Railroad Rolling stock: exporting mainly parts of the rolling stock, localization is subject to long-term domestic demand

The subsector lost a lot due to the conflict with Russia: comparing to 2013, the number of employees declined by 80%, from ca. 68 to 24 ths. The revenue fell by 62%, consisting of ca. 1,4 b in 2019. Furthermore, locomotive producer Luhanskteplovoz is now located on temporarily occupied territories.

While rail freight and passenger rolling stock production is limited to the state regulations over Ukrzaliznytsia and rail market, the domestic demand for trams is pushed by cities constantly improving their public transportation using EBRD and other creditors' funding. As for the foreign market, Ukrainian producers (Tatra-Yug and Electronmash) recently won tenders in other countries.

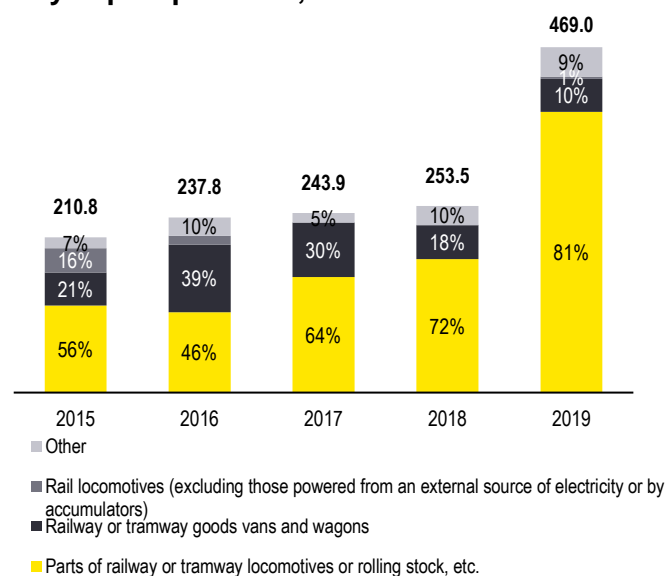
There is potential for localization of production facilities in Ukraine, following examples of Belarus (Stadler) or GE (Kazakhstan). Localization is subject to long-term stable domestic demand. Previous attempts (Hyundai, GE) have to be learned to succeed.

Subsector size



Source: State Statistics Service of Ukraine

Key export products, 2019 USD m



Source: ITC Trademap

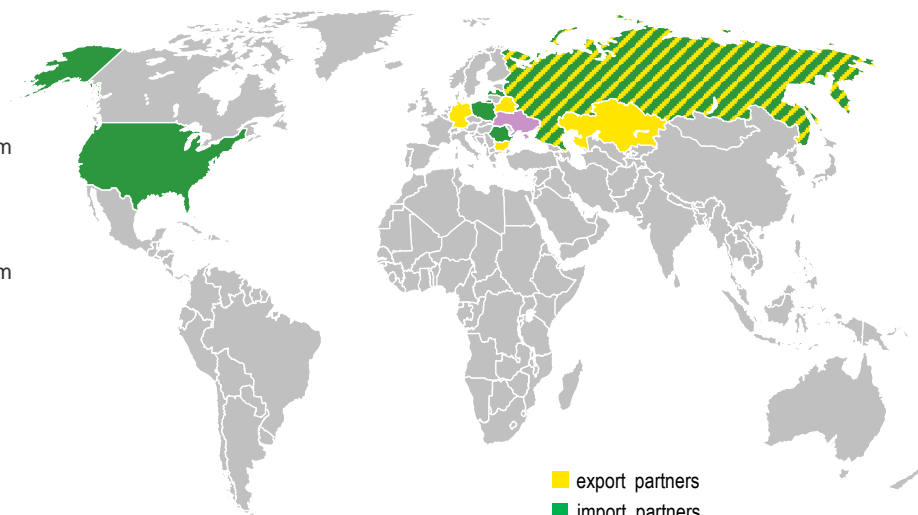
Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Belarus
Export: USD 185.8 m
CAGR 127.6%
Russia
Export: USD 189.1 m
CAGR 14.5%
Bulgaria
Export: USD 26.1 m
CAGR 11.6%

World Total

Export: USD 469 m
CAGR 22.1%



TOP Import Partners

Russia
Import: USD 82.5 m
CAGR 38.5%
U.S.
Import : USD 39.1 m
CAGR 426.9%
Romania
Import : USD 26.4 m
CAGR 389%

World Total

Import : USD 182.8 m
CAGR 48.9%

Note: due to statistical discrepancies, we use data on total foreign trade from ITC Trademap

Source: State Statistics Service of Ukraine



2.4.3.2. Engineering. Heavy machinery

Other General Purpose Machinery: the major export partners remain CIS countries, while import volumes are increasing

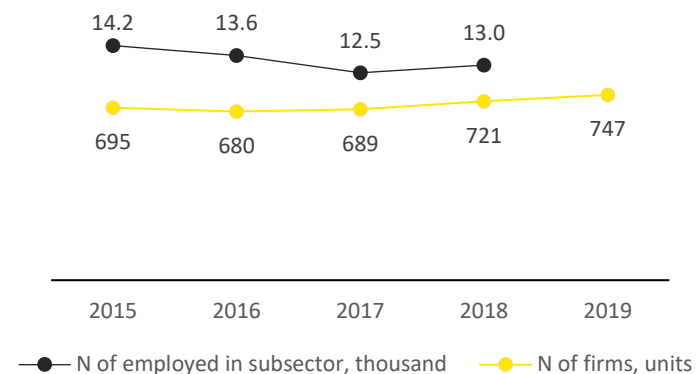
The subsector mainly consists of lifting equipment, centrifugal mechanisms, and industrial machinery for cleaning and washing that can be used in various industries as well as in construction.

Several world-known companies are represented in Ukraine since the 1990ies: American-rooted **Otis**, one of the largest lifting equipment manufacturers in the subsector; another large FDI example is **Konecranes**, which is part of the world's leader in goods handling and transporting machinery, providing equipment for Ukrainian logistic terminals and seaports.

During 2015-2019, import volumes increased twofold, while export volumes increased only slightly. Among the fastest growing were, for example, packing and wrapping machinery (\$62 m, CAGR 23%), machinery and apparatus for filtering or purifying gases (USD 56.4 m, CAGR 28%), drills and tools for working in hand (USD 60 m, CAGR 32%).

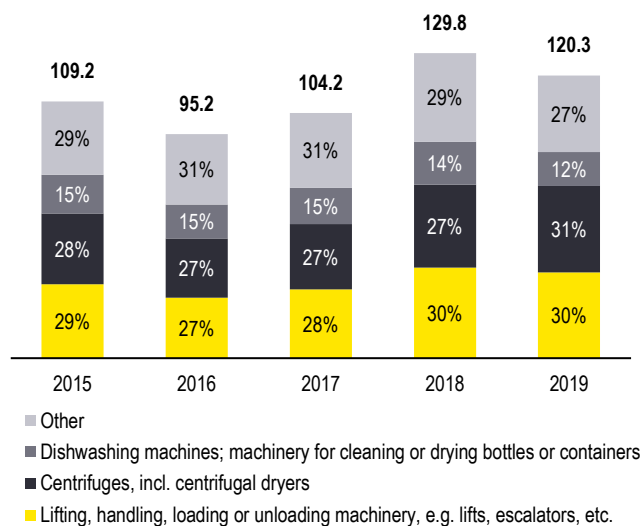
As the trade in the other machinery subsector is diversified and at a lower scale than in other subsectors, there are specific observations among key trade partners. For example, packing and wrapping machinery constitutes the largest share of export volumes to Azerbaijan, (USD 4.8 m in 2019).

Subsector size



Source: State Statistics Service of Ukraine
Number of people employed in a subsector in 2019 was stated as confidential.

Key export products, 2019 USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

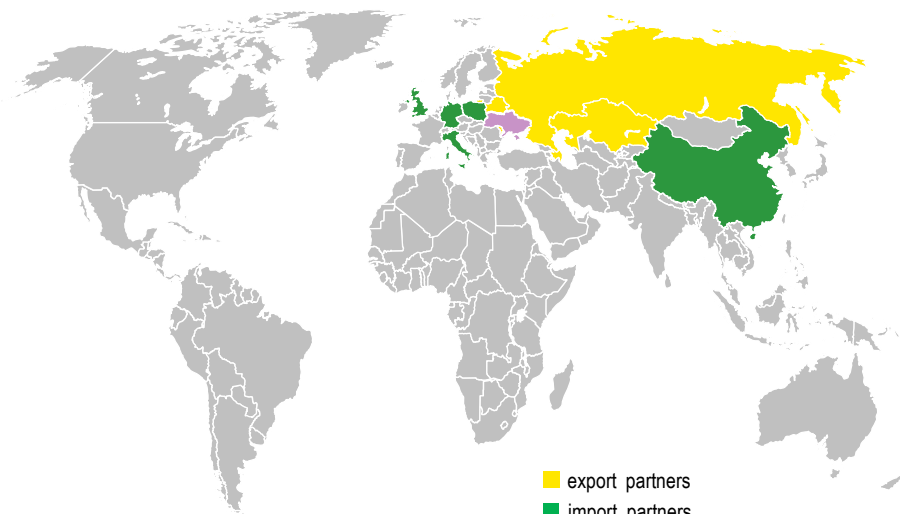
TOP Export Partners

Russia
Export: USD 46.7 m
CAGR 10.7%

Azerbaijan
Export: USD 6.1 m
CAGR 63.3%

Belarus
Export: USD 6.9 m
CAGR -2.8%

World Total
Export: USD 120.3 m
CAGR 2.4%



TOP Import Partners

China
Import: USD 196.9 m
CAGR 30.1%

Germany
Import: USD 160 m
CAGR 17.2%

Italy
Import: USD 110.6 m
CAGR 21.7%

World Total
Import: USD 868.3 m
CAGR 16.4%

Note: due to statistical discrepancies, we use data on total foreign trade from ITC Trademap



2.4.3.2. Engineering. Heavy machinery

Metalworking Machinery: Ukraine remains large exporter of rolls for metal-rolling mills; the recovery of export after lost of Russian market is observed

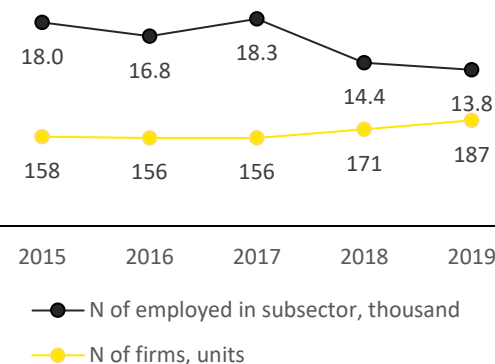
In the manufacturing of metalworking machinery, the decline in employment is observed – from 18 ths in 2017 to 14 ths employers in 2019. However, in three recent years, we observe emerging of small and medium-sized enterprises in the sector. The largest companies are situated in Donetsk and Dnipropetrovsk oblasts – close to metallurgical plants.

Metal-rolling mills (mostly the rolls) are the largest export group, providing 1,8% of world export in 2019. Ukraine ranks #15 among other exporters of the product. Also, it was the product group with the fastest growth pace in world import – CAGR 4% during 2015-2019. Among subsector's product groups, it also grew at the fastest pace (CAGR 26.8%, 2015-2019). Two other Ukrainian key export products also showed growth in world trade over 2015-2019.

Main import products are machining centres for working metal, moulds, and parts of metal-rolling mills.

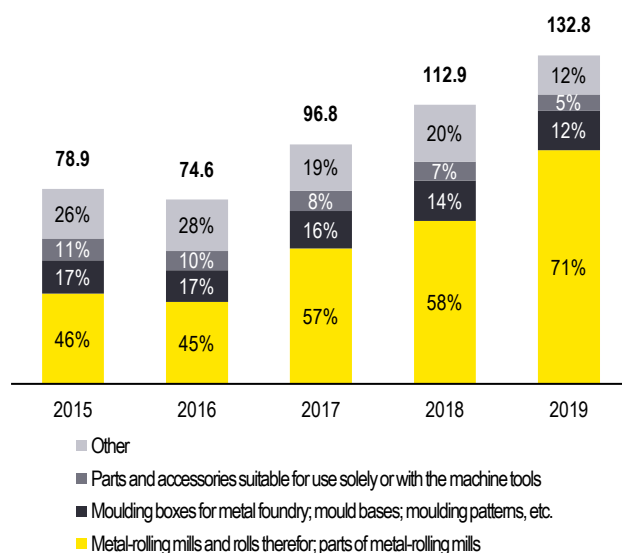
Two large metalworking machinery plants are situated in Kramatorsk, Donetsk oblast – Novokramatorsk machine building plant (sales USD 282 m, personnel 8,908) and Kramatorsk plant of heavy machine building. Those factories, as well as other metalworking machinery producers, are specialized in a variety of heavy machinery products, thus being flexible in their activities.

Subsector size



Source: State Statistics Service of Ukraine

Key export products, 2019 USD m



Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Russia

Export: USD 40.6 m
CAGR 15.8%

India

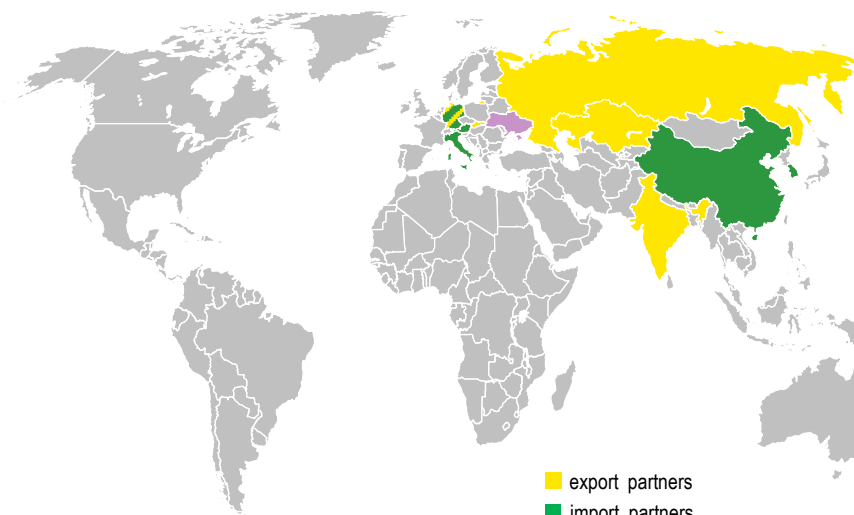
Export: USD 11.6 m
CAGR 36.5%

Kazakhstan

Export: USD 7.6 m
CAGR 2.8%

World Total

Export: USD 132.8 m
CAGR 13.9%



TOP Import Partners

Germany

Import: USD 49 m
CAGR 19.2%

China

Import : USD 49.5 m
CAGR 30.4%

Italy

Import : USD 21.5 m
CAGR 16.7%

World Total

Import : USD 275.4 m
CAGR 17.8%

Note: due to statistical discrepancies, we use data on total foreign trade from ITC Trademap



2.4.3.2. Engineering. Heavy machinery

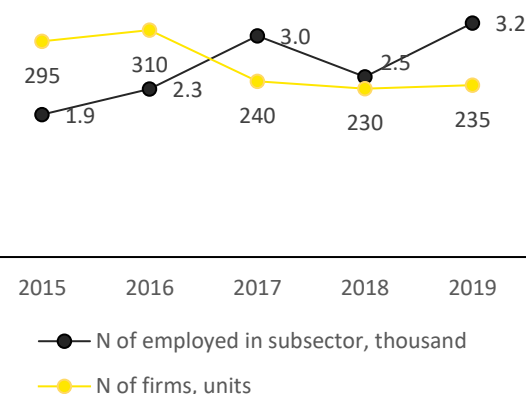
Ship and Boat Building: low foreign trade volumes and opportunities for entering low value-added products niche

Ships and boats manufacturing is divided into the following categories: 1) large vessels (cargo and passenger, tankers, etc.); 2) yachts and leisure and sport vessels; 3) light-vessels, fire-floats, dredgers, etc. The first one constitutes the largest export share and is represented by the largest players, such as **Rybalskiy shipyard**, **Smart-Maritime Group (SMG)**. On the other hand, there are such manufacturers like **Brig**, producing sport vessels and light-vessels and export-oriented. The domestic market is covered by fast-growing **Nibulon**.

Production of cargo ships and boats in Ukraine is generally low volume and a wide variety. For instance, one vessel was sold to the Bahamas (HS 890190 Other cargo and cargo-passenger vessels) for USD 13.75 m in 2019, making the Bahamas the second largest export destination for the subsector. 21 vessels of the same HS code were exported to Russia, providing for USD 18.7 m or 97% of Ukraine's ships export to Russia. However, the industry produces vessels mostly for the Ukrainian market as Ukraine experiences competition while trying to enter foreign markets, especially Turkey and other EU countries. Nevertheless, we may have some niche on low-value added production (e.g., SMG construction of steel part and further equipment in the Netherlands).

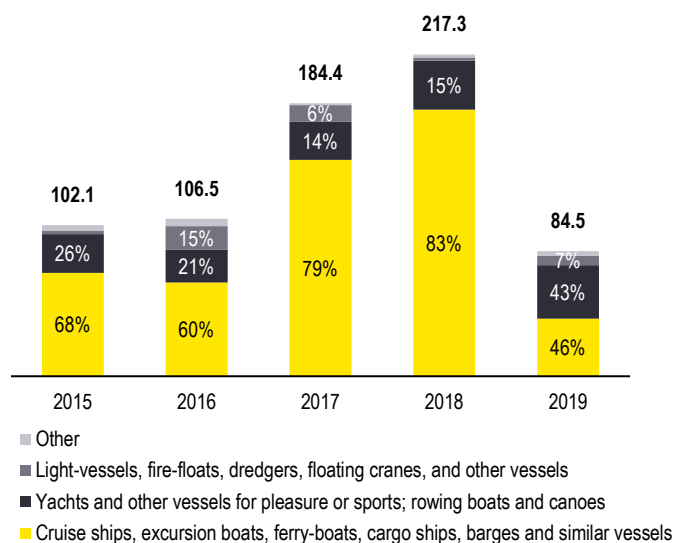
Import figures are low and unstable due to the fact that most materials and components are produced domestically, and domestic demand is weak. This might change if the internal waterways will be used more actively. Another potential to exploit the existing production facilities is the re-equipment and modernization of the fleet. That is the expansion of navigation areas, reclassification, an increase in carrying capacity, and other complex services.

Subsector size



Source: State Statistics Service of Ukraine

Key export products, 2019 USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Russia

Export: USD 19.4 m
CAGR -12.7%

The Bahamas

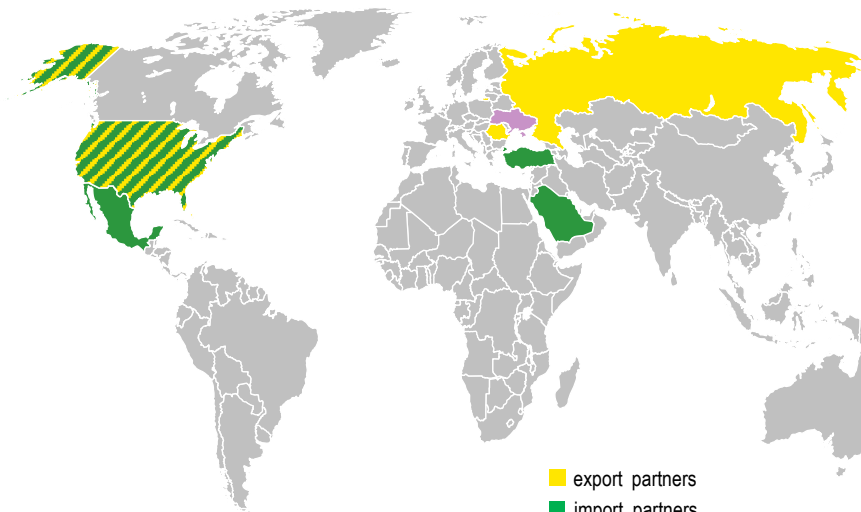
Export: USD 13.8 m
CAGR -

Malta

Export: USD 9.6 m
CAGR 86.2%

World Total

Export: USD 84 m
CAGR -4.8%



TOP Import Partners

U.S.

Import: USD 2 m
CAGR -1.3%

Saudi Arabia

Import : USD 1.8 m
CAGR -

Mexico

Import : USD 0.9 m
CAGR 45.7%

World Total

Import : USD 15.8 m
CAGR -16%

Note: due to statistical discrepancies, we use data on total foreign trade from ITC Trademap

Source: State Statistics Service of Ukraine | National Strategy to Increase Foreign Direct Investment in Ukraine | Section 2.4: Advanced Manufacturing | Page 63 of 137



2.4.3.2. Engineering. Heavy machinery

Top companies

Monopsonies

Some companies or even whole segments work for a very limited list of customers, up to one. In heavy machinery, this is the case for rolling stock (Ukrzaliznytsia) and metalworking equipment (mostly Metinvest). This has both advantages and disadvantages:

- ▶ The demand for products is guaranteed;
- ▶ A customer can help its contractor by lending or equity participation;
- ▶ No costs for marketing activities;
- ▶ BUT: no diversification.

Kryukovskiy carriage building plant

Leading Ukrainian manufacturer of rolling stock based in Kremenchuk. It is capable of mass production of all range of respective products. In 2011, the plant produced 11 thousand carriages (twice as in 2019). There are plans to collaborate with General Electric (US) and Alstom (France).



Subsector – railroad rolling stock



Ownership – mixed (Ukrainian, Russian and Estonian businessmen)



Revenues – \$323 m in 2019, CAGR in 2015-2019 is 6%

State ownership

Most major players are based on Soviet legacy, and some of them are still state companies. Besides military production, this is the case for heavy electrical machinery building. The three largest players on this market, Zorya-Mashproect, Turboatom, and Elektrovazmash, are state-owned enterprises.

But this sector is declining in terms of revenues, that's why new investments are needed to allow for more competitive product manufacturing that may enter markets other than post-Soviet. Currently, State property fund of Ukraine is preparing Turboatom and Elektrovashmash for privatization.

Novokramatorsk machine building plant

One of the largest heavy machinery plants in Ukraine is based in Kramatorsk. It is capable of producing metalworking, mining, lifting, and energy machines, as well as custom equipment for deep water, space, and military applications. The plant had built the three most powerful presses in the world (650-750 MN).



Subsector – metalworking machinery



Ownership – former top-managers (primarily Georgy Skudar).



Revenues – \$257 m in 2019, CAGR in 2015-2019 is 4%

Low CAPEX

Most owners tend to exploit the existing production base. During the last ten years, capital investments in heavy machinery production were only \$1,8 billion (2,3% of total industrial CAPEX in this period and 0,8% of total CAPEX in the economy).

Mostly these investments were brownfield (technical modernization of existing assets).

Zorya – Mashproject

One of the largest gas turbine producers in Ukraine is based in Mykolaiv. It was primarily created to build engines for ships (mainly for military ones) but also makes machines for various energy applications. This state-owned enterprise is not subject to privatization.



Subsector – engines and turbines



Ownership – state-owned (Ukroboronprom)



Revenues – \$134 m in 2019, CAGR in 2015-2019 is -11%

2.4.3.3. Engineering. Aerospace





2.4.3.3. Engineering. Aerospace

Production and R&D facilities mostly in clusters

Aerospace production base in Ukraine



Note: 82% of presented companies are private, others are state-owned.



100+ engineers, specialists, and workers employed in the aerospace industry



200+ R&D, engineering centers, and production companies including Boeing, Skyrora, Firefly Aerospace



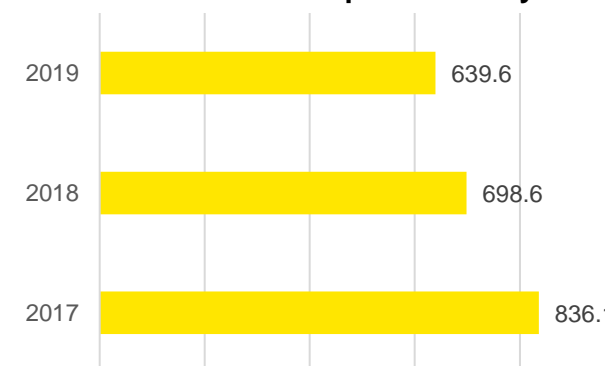
10+ countries benefited from cooperation with Ukraine in the aerospace industry

Ukraine is one of the few countries that have a developed aerospace industry. Ukraine has a full cycle of design, manufacture, and operation of civil and military aircraft, as well as developments in space technology.

There are several production and R&D clusters in Ukraine. The biggest ones are organized in Kharkiv, Kyiv, and Dnipro.

The foundation of competitive technological and production experience was laid during the Soviet era and is still being improving. This, combined with up-to-date technologies, in-depth technical education, and qualified engineers, creates a potential for industry development.

Historical sales in aerospace industry

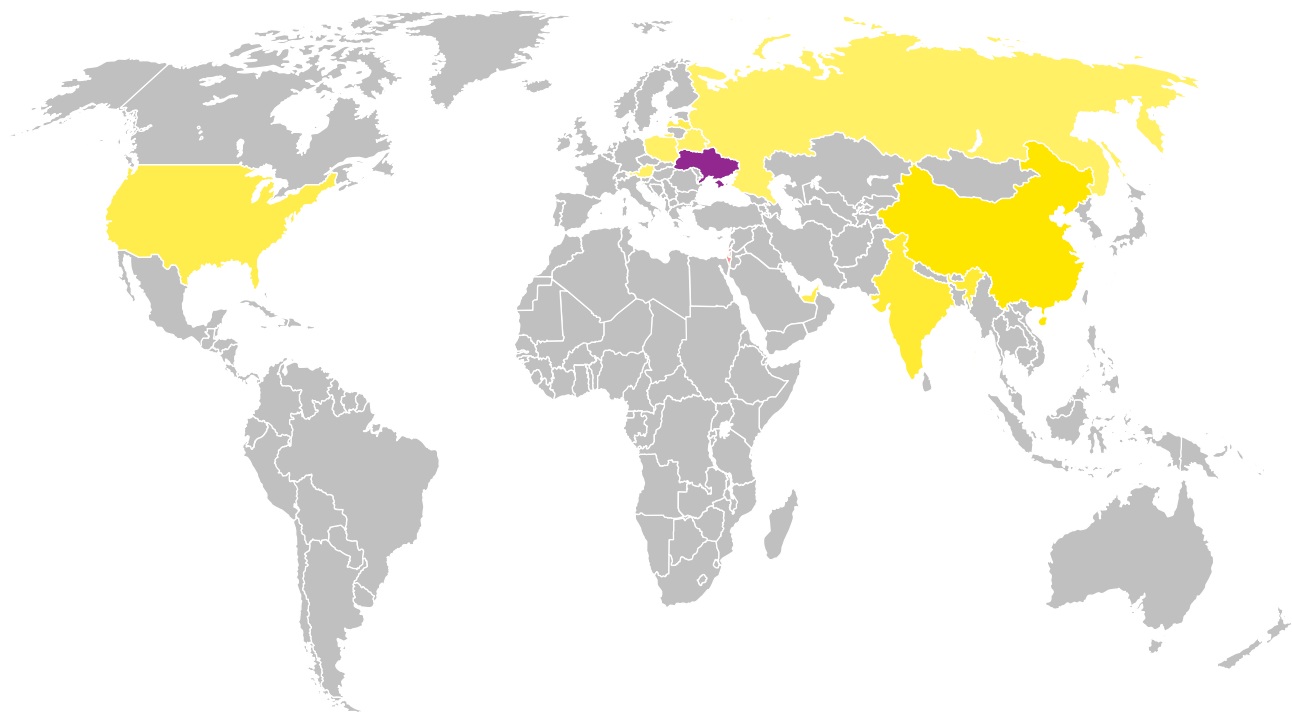


Source: State Statistical Service of Ukraine

Note. The discrepancy between sales and export volumes we attribute to the facts that (1) Ukrainian NACEs are assigned based on company's main economic activity, which does not necessarily reflect its export-oriented production; (2) tolling schemes: only production costs are counted towards sales, but not raw materials costs, whereas total costs are counted towards export volumes.

2.4.3.3. Engineering. Aerospace

India and China among main export partners, unlike the other engineering subsectors

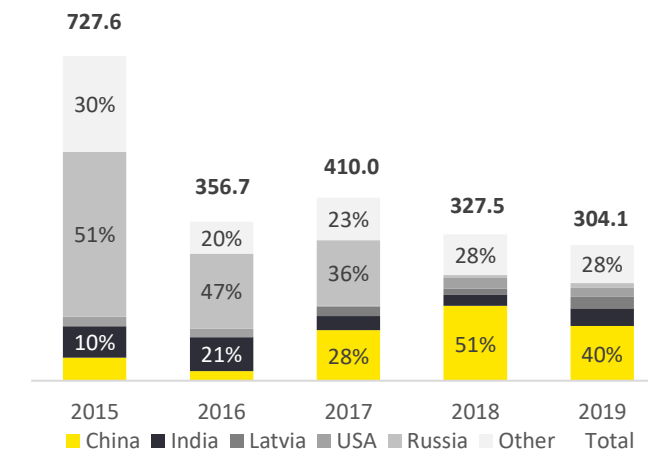


Legend to the map:

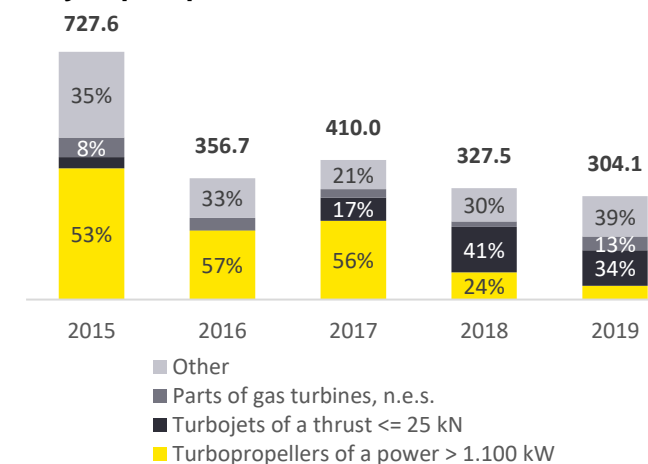
Ukraine 120-150 USD m 30-50 USD m 15-30 USD m 5-15 USD m <5 USD m

In 2019 total export of aerospace products amounted to 304 USD m according to the State Statistics Service of Ukraine and decreased with CAGR -19.6% in 2015-2019 due to reduction of contracts with Russia by 97.6% and due to lack of private investments, which could accelerate industry development. At the same time, China became a major buyer, export to this country increased by 139.4% and occupied 40.4% of total aerospace export in 2019.

Export by countries, 2019, USD m



Key export products, 2019, USD m



Source: State Statistical Service of Ukraine

Note. The discrepancy between the State Statistics Service of Ukraine data and ITC Trademap data may occur due to the differences in methodology.



2.4.3.3. Engineering. Aerospace Clusters

Most of the companies are state-owned

Most of the Ukrainian companies in the aerospace industry are state-owned as there was no legal framework for private companies until 2019. However, on October 25, 2019, bill #1071 was signed by the President of Ukraine. It assumes that private companies are now able to join the development of Ukraine's space industry. For more information, please see the legal part of this report.

Kharkiv cluster

Regional: the Kharkiv enterprise with aerospace production specialization JSC FED has founded one of the most significant Ukrainian aerospace clusters – Meckhatronika. The cluster includes the largest producers such as Motor Sich, Antonov and actively participates in regional and international programs.

International: at the time, there are no notable international aerospace players. However, it is a favourable region due to its qualified engineers and educational base.



Organizations – 26



50% of them are science facilities

International R&D centres

Several international companies have opened R&D offices in Ukraine, and the aerospace industry is no exception. Nowadays, there are three major R&D international players in this industry, such as Boeing (Kyiv), Skyrora (Dnipro), and Firefly (Dnipro). The two main reasons for investing in an R&D centre in Ukraine are educated engineers and cost-efficiency.

Kyiv cluster

Regional: the largest state defence holding group in Ukraine, Ukroboronprom, operates in Kyiv and includes 21 aerospace producers and seven science facilities that make studies in this industry. In Kyiv, it manages Antonov (aircraft production) and Plant 410 (aircraft repairs).

International: the Ukrainian Boeing R&D office provides various types of services in support of Boeing's commercial airplane programs, including consultation, research, and technical assistance services.



Organizations – 29



32% of them are science facilities

Aerospace production

The two largest factories are located in Kyiv (Antonov) and Zaporizhzhia (Motor Sich), with total operating revenues of USD 326.6 m and 486.8 USD m in 2018, respectively. Antonov specializes in the production of aircraft and aeroplanes (famous for producing the largest cargo plane in the world). Motor Sich produces aircraft engines, gas-turbine engines, turbojet engines, etc.

Dnipro cluster

Regional: the Dnipro State Cluster was founded by aerospace producer Uzhmash and NCTCSV1 to acquire funding from foreign and regional donors, to create a business incubator for aerospace startups, and to obtain the status of a partner of the European Space Association. The cluster is in the list of pilot organizations of Innovative Development of the state².

International: there are two R&D centres: Firefly and Skyora. While Firefly develops, tests and ships finished rocket stages to the USA, Skyrora is executing design tasks for a British parent company.



Organizations – 11



46% of them are science facilities

Source: CTS, EMIS, USPA, publicly available data, EY calculations and analysis

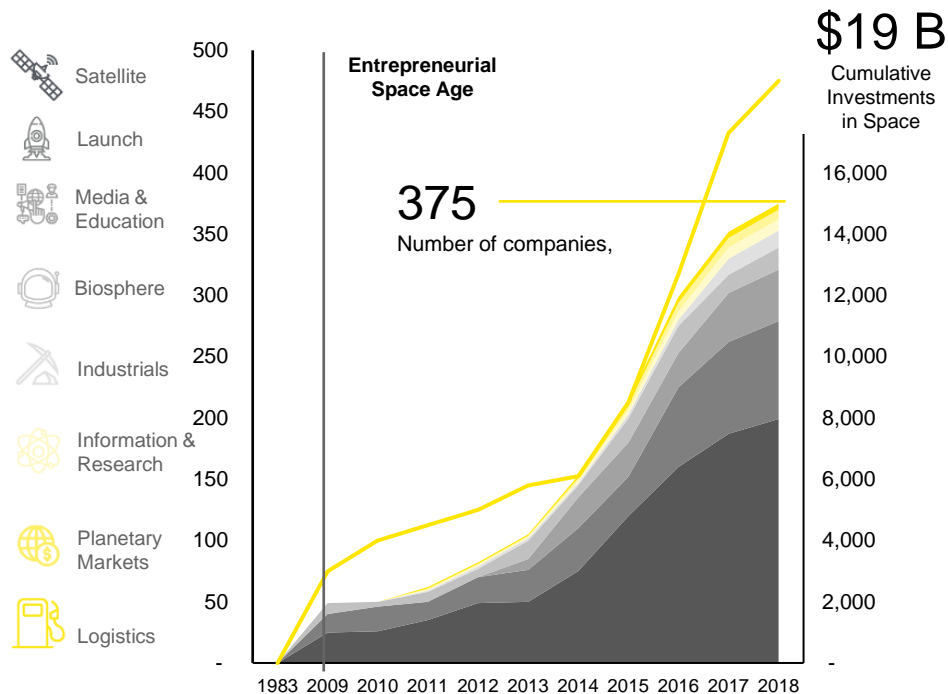
1. National Control and Test Center for Space Vehicles.

2. Projects have special support of the Cabinet of Ministers and the Prime Minister of Ukraine.

2.4.3.3. Engineering. Aerospace

Global trends. Private investments in space industry, robotics technologies evolution

Private Equity Investments in Space From 2009 To Present



Source: Space Capital, Space Investment Quarterly, Q3 2020

Robotics Revenue by Type (USD m)

Segment	2019	2020f	2021f	2022f	2023f	2024f	2025f
AGV	7,872	6,883	9,503	13,060	17,773	23,677	30,452
AMR	2,581	2,713	5,055	8,956	14,958	23,803	35,266
ROV	1,368	1,414	1,951	2,568	3,326	4,196	5,129
Total	11,821	11,010	16,509	24,584	36,057	51,676	70,847

Source: ABI Research

Key macro drivers

- ▶ Investment costs, which are most often made by capital-intensive industries such as energy, chemical industry, construction, and transportation and distribution.
- ▶ Cyclical demand reflecting investment volatility
- ▶ For trade-intensive countries, demand tends to correlate with exports. Thus, the exchange rate is important in determining competitiveness.
- ▶ High-frequency indicators of future demand include new orders, lagging behind capital goods, and capacity utilization among key customer sectors.

Long-term trends

- ▶ The recovery from the end of 2016 in the global capex gave this sector a boost, but the cycle came at a negative turning point.
- ▶ Protectionism is an important contributing factor.
- ▶ Investment costs are increasingly driven by cost reduction initiatives and / or the use of automation and data / information.
- ▶ Developments in green energy, such as hydrogen technology and electric vehicles, provide further opportunities for equipment manufacturers.
- ▶ Machinery and metal products that are exposed to advanced manufacturing processes such as automation and electric vehicles benefit in the medium and long term as they become more common in different countries.

Robotics

- ▶ Autonomous mobile robots (AMR) are becoming popular due to better affordability.
- ▶ By 2025 they are expected to exceed Automated Guided Vehicles (AGV) in global revenue.
- ▶ AGVs are the most popular robots, being represented, for example, by Amazon. They require external infrastructure to navigate.
- ▶ Remotely Operated Vehicles (ROV) require operation by the human worker and comprise a niche for equipment for manipulation and inspection.
- ▶ As ROV starts to mature, they will be used more widely not only in logistics and manufacturing, but in real estate, retail, etc.

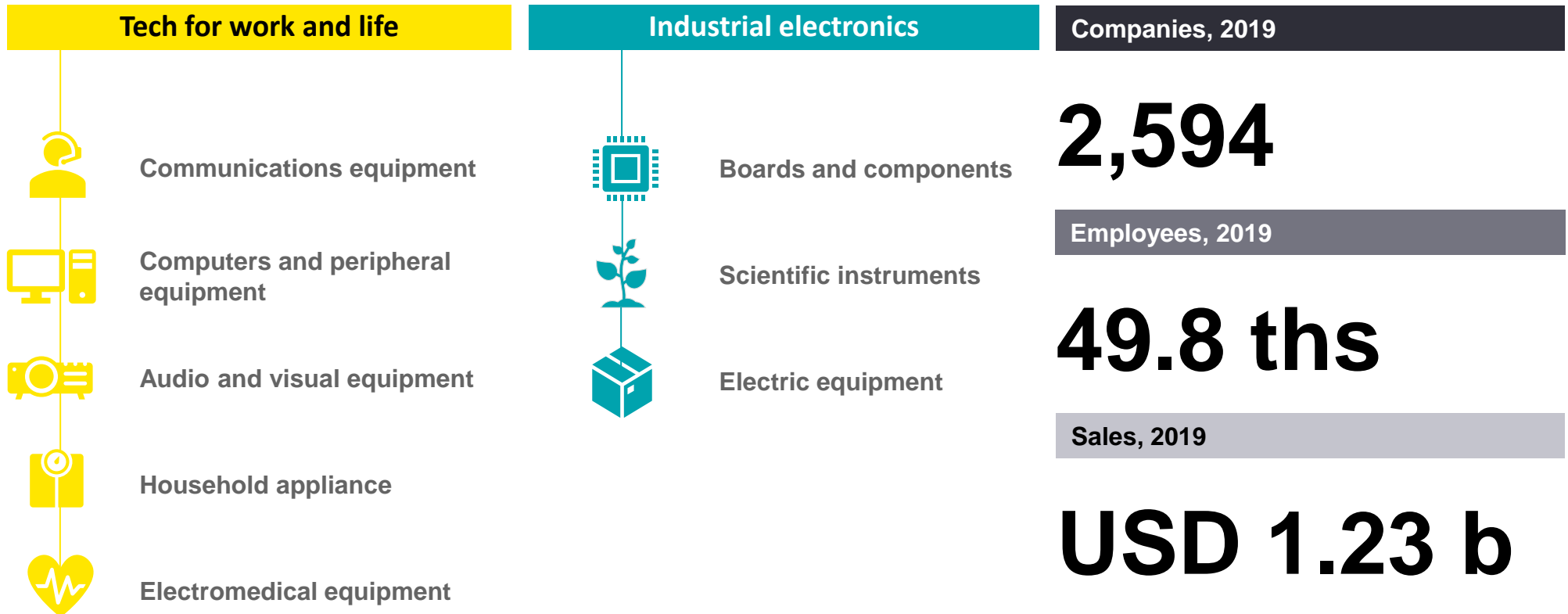
2.4.4. Electronics





2.4.4. Electronics

Ukraine's electronics sector can be divided into tech for work and life and industrial tech



Ukraine has the production of electronics that can be divided into tech for work and life (equipment people use in their daily routine at homes and offices like vacuum cleaners, e-wearables, and printing machines) and industrial electronics, which includes scientific instruments, boards, and components and electrical equipment other than car wiring (automotive industry) or industrial robots for power stations and electricity distribution equipment (heavy machinery).

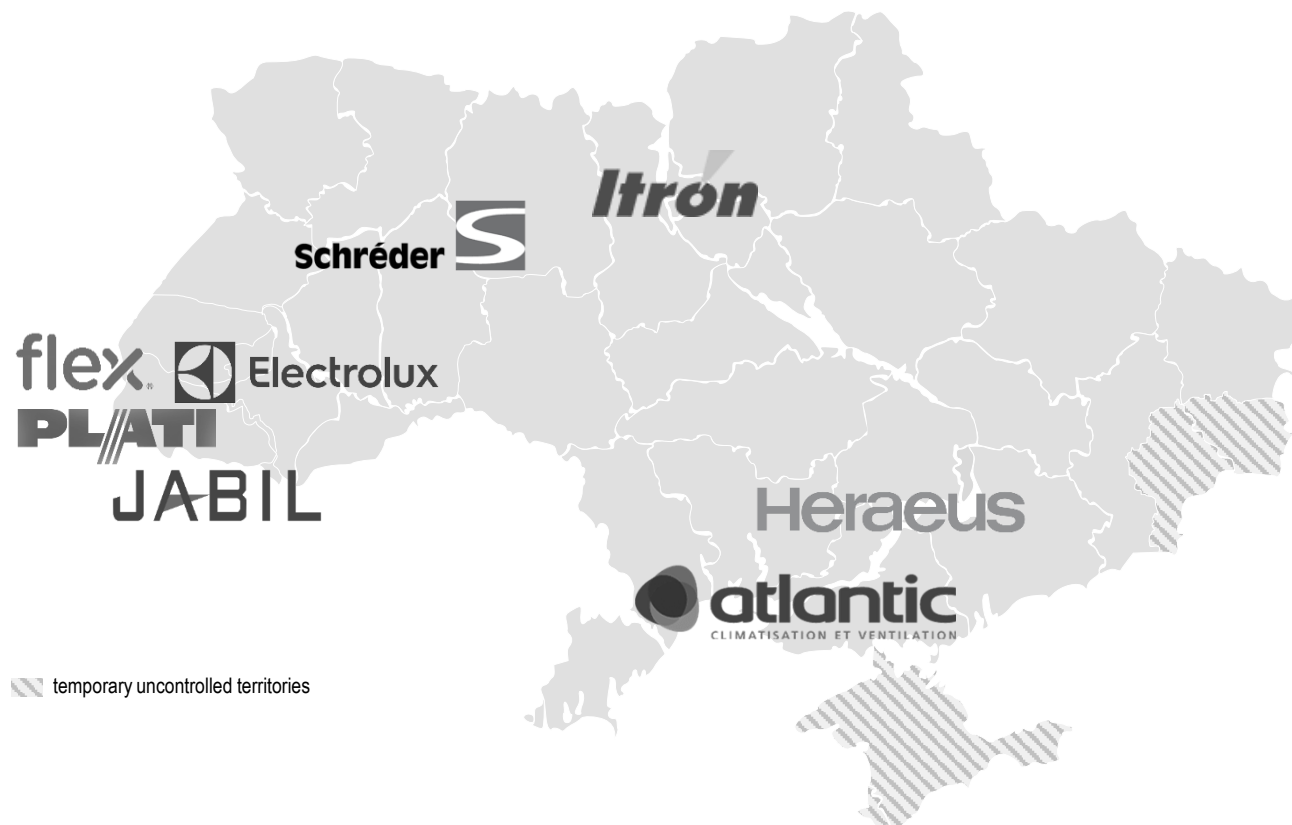
In total, there are over 2,5 ths companies in the sector and almost 50 ths employees. Total sales of the segment exceed USD 1,2 b (SSSU data), and a significant share of the products are exported, including tolling schemes for household and office electronics in FDI-governed plants.



2.4.4. Electronics

High level review of FDI in electric and electronic production

Unlocked FDI from Brands



“Producing in Ukraine is much cheaper than in EU countries, and Ukrainian engineers are competent enough for us to test cutting-edge AI technologies on our Ukrainian plant” - Alessandro Parimbelli, global executive, Jabil

«Ukraine is working hard to leave behind the commodity-exporting countries group. I am sure we will have something interesting to propose even to China.» – Volodymyr Zelenskiy, President of Ukraine

FDI equity

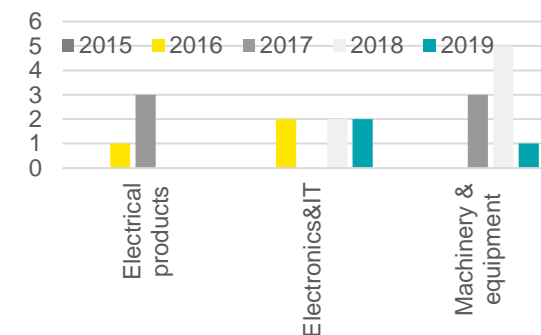
USD 34 m

Sales by companies with FDI, 2019

USD 236 m

Source: "Ukraineinvest"

Number of FDI projects in Ukraine (electronics-related sectors)

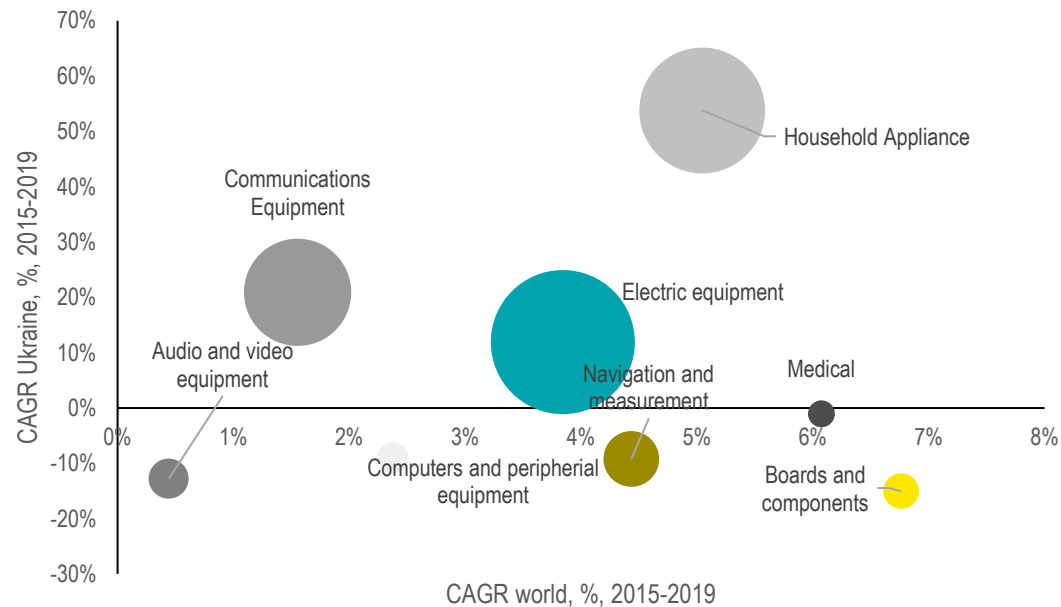


Source: "EY Proprietary database"



2.4.4. Electronics

The fastest growing subsectors that have the highest potential are household appliances, communications and electric equipment



Besides two obvious subsector growth potential indicators as CAGR for Ukraine exports and global growth, the EU imports growth represents the dynamic of demand in Ukraine's key market, and the volume of EU's exports from China indicates the potential for the relocation of production facilities closer to EU borders in each of the segments.

According to this scoring, the fastest growing Ukrainian subsectors have the highest potential: household appliances, communications equipment, electric equipment. Computers and peripheral equipment, as well as boards and components, are marginally attractive, while the other segments are lagging.

In the global market, however, the situation is quite different: the fastest growth is observed in boards and components incl. Solar panels (50% of the market is occupied by China, Hong Kong (China), and Malaysia), and electromedical devices (US, Germany, Netherlands, China, Switzerland, Singapore). While it is hard to compete with China in the boards and components market, production of the parts for medical devices for EU companies and wires for domestic intermediate consumption could be an attractive development area for Ukraine.

Potential scoring table for subsectors

Subsector	EU import CAGR, 2015-2019	EU Import from China, USD m	Export from Ukraine, 2019, USD m	Export from Ukraine CAGR, 2015-2019	Average score*
Household appliance	6%	16,267	515	45%	2.1
Communications equipment	4%	63,428	352	21%	1.3
Electric equipment	6%	23,311	654	10%	0.9
Computers and peripheral equipment	0%	57,704	69	11%	0.2
Boards and components	9%	14,555	14	-10%	-0.5
Electromedical equipment	4%	4,381	20	0%	-0.6
Scientific instruments	4%	6,753	105	-8%	-0.8
Audio and video equipment	1%	12,009	49	-13%	-1.2
Other	-5%	2,298	21	2%	-1.2

*The average score is calculated as a mean of the subsector's deviation from the average of each variable represented in table.

2.4.4.1. Electronics.

Electronics for work and life





2.4.4.1. Electronics. Electronics for work and life

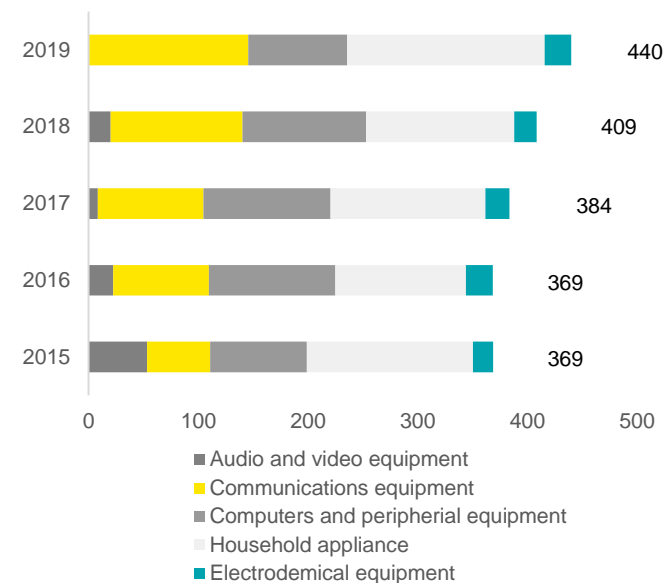
The production base of tech for work and life is densely concentrated in the West and big cities

Tech for work and life production base in Ukraine



The work and life tech production clusters are concentrated in the West, where there was once a free economic zone and proximity to the EU border. There are also facilities concentration around the big cities – Kyiv, Kharkiv, Odesa as they are both large logistical centers and hubs for domestic demand.

Subsector sales, USD m



Source: State Statistical Service of Ukraine

Note. Data on Audio and video equipment sales in 2019 are not available. The discrepancy between sales and export volumes we attribute to the facts that (1) Ukrainian NACEs are assigned based on company's main economic activity, which does not necessarily reflect its export-oriented production; (2) tolling schemes: only production costs are counted towards sales, but not raw materials costs, whereas total costs are counted towards export volumes.

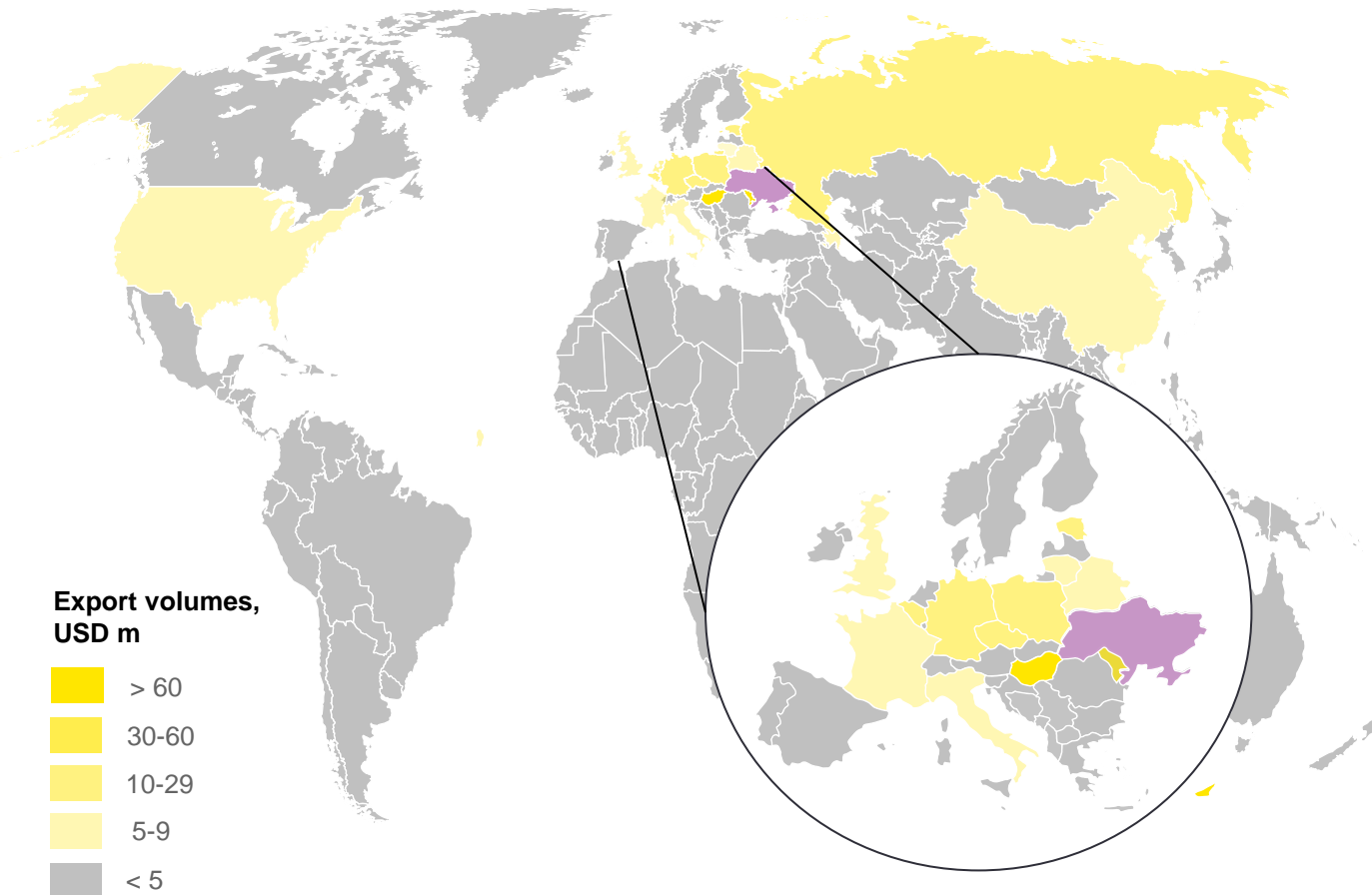
Major players





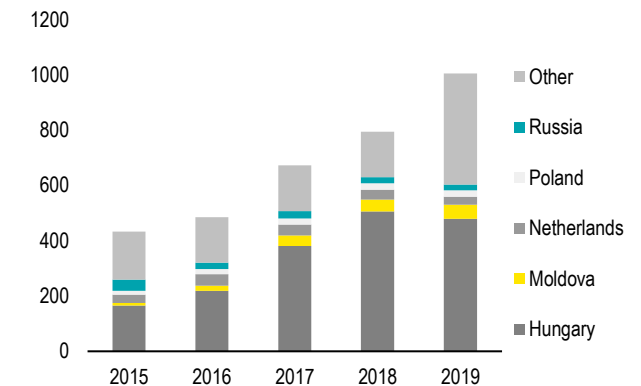
2.4.4.1. Electronics. Electronics for work and life

Ukraine's tech for work and life exports have been directed towards European partners. Household appliances is the fastest-growing subsector.



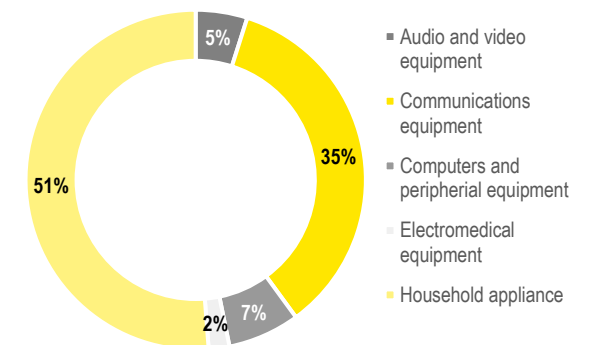
The main export trade partner for Ukraine in life&work tech is Hungary. It is a large European electronics hub, where different goods are accumulated to be then sold throughout the EU. 54% of household appliances and 55% of communications equipment are shipped to Hungary. Export markets for computers, MedTech, and Audio&video goods are smaller and more diversified. The markets of Latin America, Africa, the Middle East, Australia, Canada, and the USA are underexplored.

Export by country, USD m



Source: State Statistical Service of Ukraine, ITC Trademap

Export structure by subsector in 2019, USD m



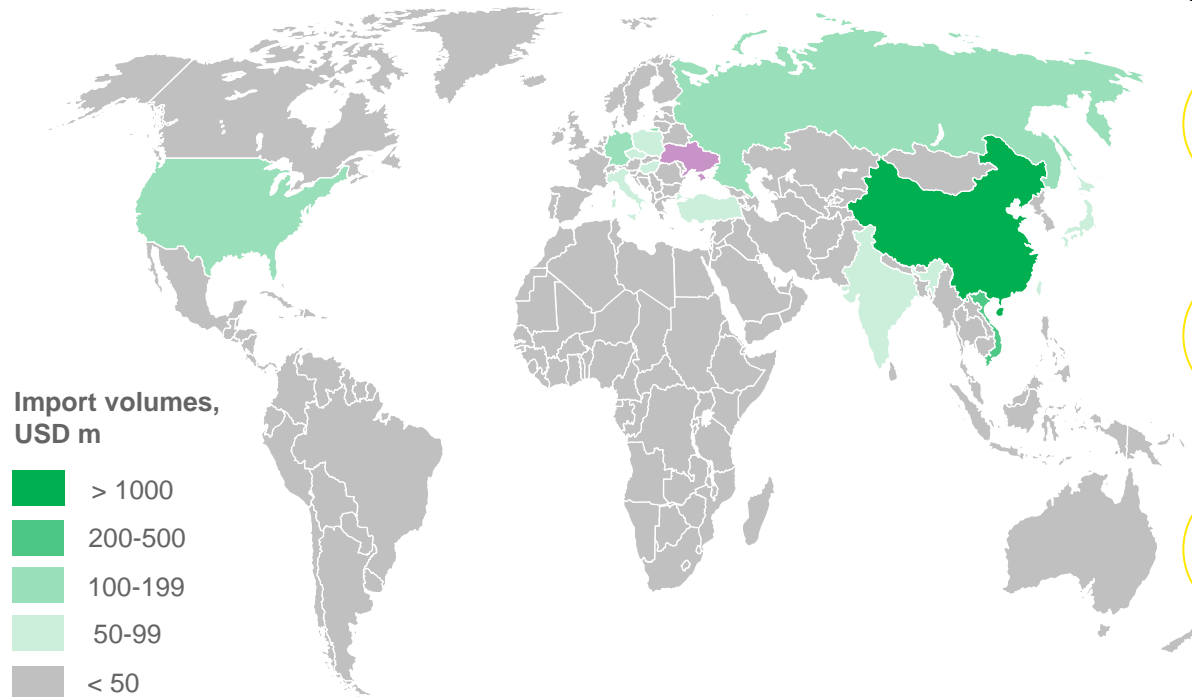
Source: ITC Trademap



2.4.4.1. Electronics. Electronics for work and life

Existing production facilities create favorable conditions for localization of several heavily imported goods

Import heat map



Total Ukrainian imports of work and life tech amount to USD 3.1 b. From the TOP-5 imported goods by volume, we see the localization potential for the good where production facilities in Ukraine already exist, as large import volumes indicate high domestic demand.

Namely, it is TVs (as Ukraine had once large export of TV reception apparatus and a significant share of imports coming from Russia), data transmission machines (as Ukraine has a developed communications equipment subsector), and medical appliances segment (as having a high potential globally and worth creating even from scratch as shown in the respective slide). We are, however, sceptical about mobile phone production.

The major trade partners for these goods are China and the Czech Republic (which is likely the logistics hub for the goods produced across the EU), although some items come from other European and Asian countries. From Russia, Ukraine imports TVs, which is another natural candidate for localization.

TOP-5 largest from imported goods

	Mobile phones Volume in 2019 : USD 570 m CAGR 2015-2019: 14%	Suppliers Hong Kong (China) and China – 37% Czech Republic– 33% Vietnam – 22%
	Laptops Volume in 2019 : USD 236 m CAGR 2015-2019: 5%	Suppliers China – 47% Czech Republic – 24% Germany– 13%
	TVs Volume in 2019 : USD 205 m CAGR 2015-2019: 14%	Suppliers China– 45% Russia – 23% Hungary –11%
	Voice and data transmission machines (incl. routers) Volume in 2019 : USD 164 m CAGR 2015-2019: 2%	Suppliers China– 23% Czech Republic– 13% Netherlands– 10%
	Medical appliances Volume in 2019 : USD 116 m CAGR 2015-2019: 25%	Suppliers Poland – 22% Germany– 19% Czech Republic– 12%

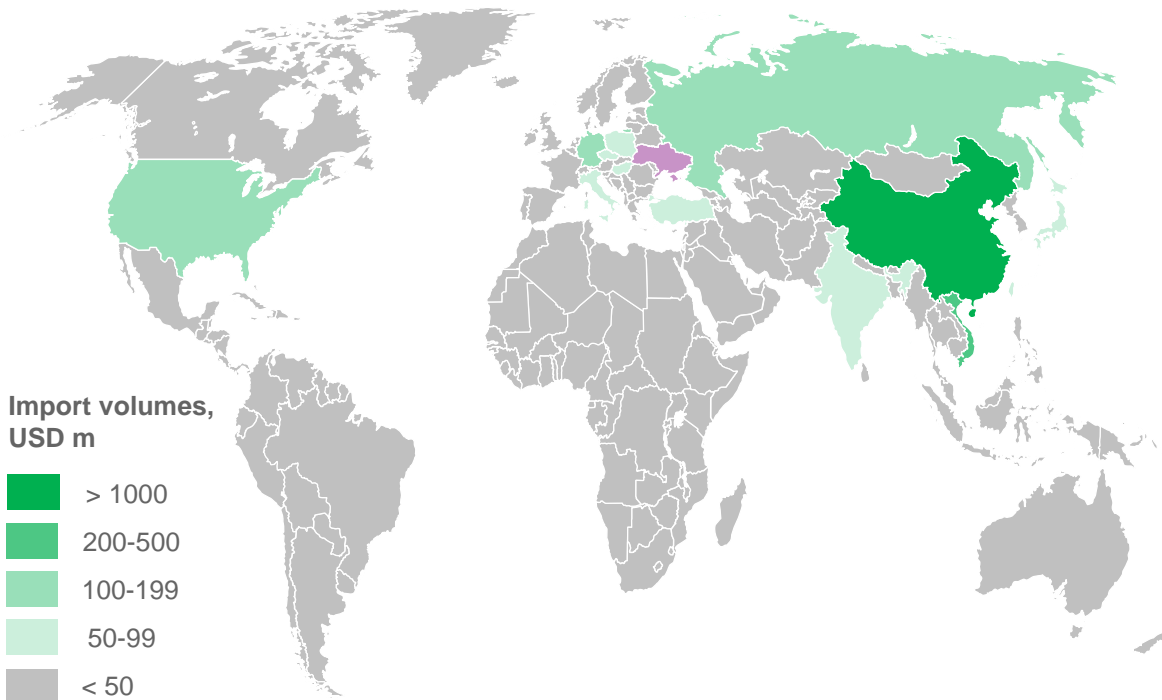
Source: ITC Trademap



2.4.4.1. Electronics. Electronics for work and life

Many imported goods could be produced locally. These include household appliances, computer units, and medical apparatus

Import heat map








The total work and life tech import was growing at a sizeable 16% CAGR in 2015-2019, but some goods imports were growing at a much faster pace. These markets could also be rising domestically as the imports growth often implies high domestic demand.

Namely, these are parts of heaters (for flourishing local production of finished goods), computer units (as computers are widely assembled locally), network apparatus (imported mainly from Turkey, which means the level of sophistication of production is bearable for Ukraine), vacuum cleaners (Chinese appliances could be partly offset with cheaper local products in the lower-price segment) and X-rays apparatus (there is established production and export from Ukraine).

Interestingly, China is not the leader in most of the fastest-growing segments. Hungary, Netherlands, Turkey, and Germany are covering their segments better.

TOP-5 fastest-growing from TOP-30 largest imported goods

	Parts of water and other heaters Volume in 2019 : USD 70 m CAGR 2015-2019: 162%	Suppliers Hungary – 92% China – 3% Poland – 1%
	Computer units Volume in 2019 : USD 29 m CAGR 2015-2019: 77%	Suppliers Netherlands – 40% Germany – 15% Hong Kong (China)– 10%
	Networks apparatus (excl routers and telephone sets) Volume in 2019 : USD 54 m CAGR 2015-2019: 64%	Suppliers Turkey – 80% China – 7% Greece – 3%
	Vacuum cleaners Volume in 2019 : USD 28 m CAGR 2015-2019: 62%	Suppliers China– 32% Germany– 20% France– 12%
	X-rays apparatus Volume in 2019 : USD 56 m CAGR 2015-2019: 58%	Suppliers Germany – 52% Italy – 22% Poland – 17%

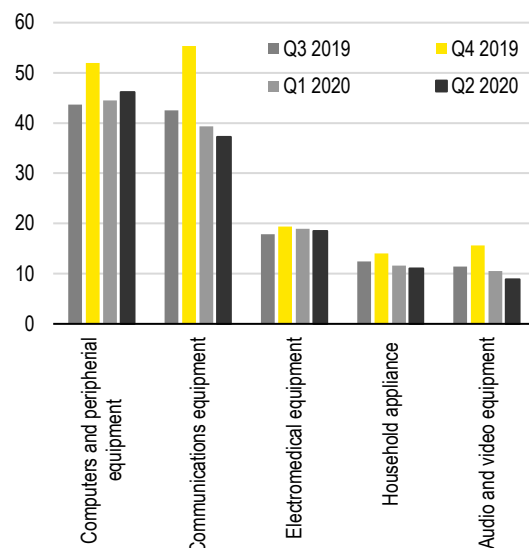
Source: ITC Trademap



2.4.4.1. Electronics. Electronics for work and life

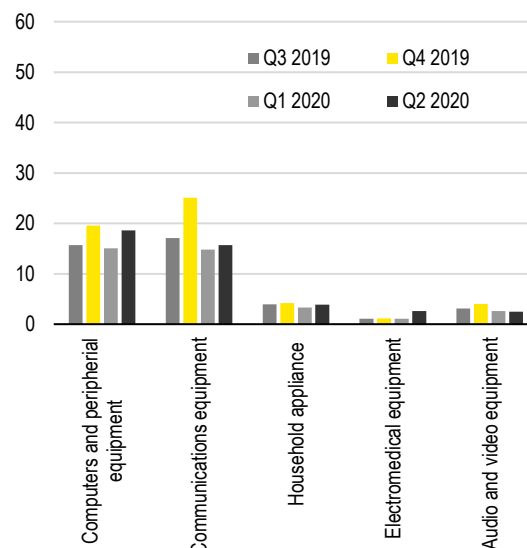
Favorable geographical location at the intersection of trade routes to Europe is a strategic advantage for the near-shoring potential

EU 28 imports from world, \$ b



Source: ITC Trademap

EU 28 imports from China, \$ b



TOP-5 goods with the largest share of China's imports among the TOP-30 goods by volume imported by EU from China

	Light-emitting diode "LED" lamps	China's share
	Import from world in 19Q3 – 20Q2 : USD 2,2 b	Share – 65% Volume 19Q3 – 20Q2 : USD 1,4 b
	Laptops	China's share
	Import from world in 19Q3 – 20Q2 : USD 63 b	Share – 62% Volume 19Q3 – 20Q2 : USD 39 b
	Electro-thermic domestic appliances	China's share
	Import from world in 19Q3 – 20Q2 : USD 2,6 b	Share – 57% Volume 19Q3 – 20Q2 : USD 1,4 b
	TVs	China's share
	Import from world in 19Q3 – 20Q2 : USD 3,3 b	Share – 54% Volume 19Q3 – 20Q2 : USD 1,8 b
	Semiconductors	China's share
	Import from world in 19Q3 – 20Q2 : USD 13 b	Share – 51% Volume 19Q3 – 20Q2 : USD 6,7 b

Source: ITC Trademap

EU-28 countries imports from China mainly consist of computers and peripheral and communications equipment. Imports of household appliances, electromedical equipment, and audio and video equipment are much smaller.

The near-shoring trend is not yet visible on short-term data, and a decline in consumption could be easily attributed to the COVID effects, which is also reflected in world import volumes and keeping seasonality (e.g., Christmas sales peak) in mind.

In case the talked-about near-shoring trend is implemented, some opportunities for Ukraine may arise in the areas where China occupies a significant share of imports and where Ukraine can develop local production of substitutes. This slide represents TOP-5 of such goods, and exporters and investors are encouraged to explore other areas. Among the top 5 are LED lighting lamps, laptops, electro-thermic domestic appliances, and TVs. We are sceptical of semiconductors production as China's monopoly is substantial, based on technology, scale, and logistical advantages.



2.4.4.1. Electronics. Electronics for work and life

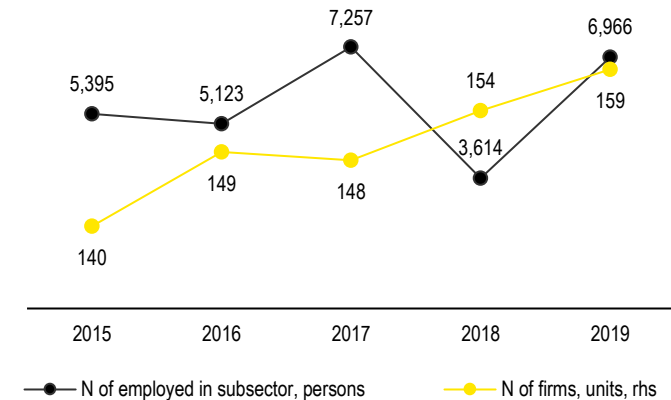
Household appliances is the fastest-growing subsector in terms of exports. The local demand is booming with plenty of untapped potential for localization

Ukraine mostly imports consumer electronics and white goods (in substantial part via grey schemes, which distort the local market). Experts argue that there is a problem to ensure the quality of locally produced goods when the volumes become substantial, so in the mass segment, price competition remains the key. Production is capital intensive, so the risks of macroeconomic stability and currency stability are considered carefully.

The sector is the second-largest and the fastest-growing in terms of exports. The exports, stagnating before 2016, recently got a boost from electro-thermic coffee/tea makers. Without this item, the imports would be 6x bigger than exports. The other popular product is thermic appliances, washing machines, heaters. Hungary is the primary market as one of the biggest logistics hubs of Eastern Europe.

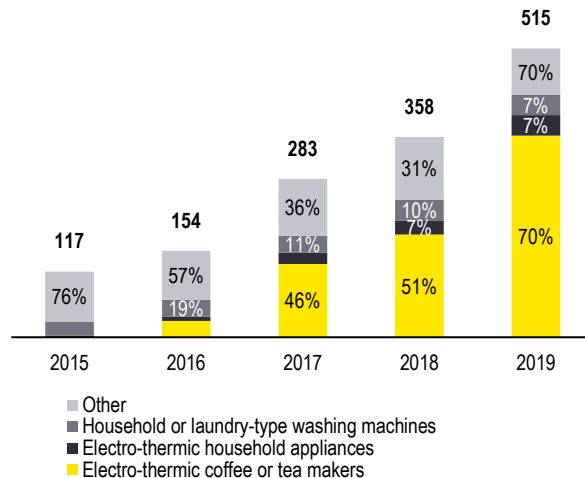
In recent years, the official imports grew significantly, grey imports likely as well, indicating growing domestic demand and local market potential. Price competitiveness is traditionally a key for choosing locally-produced goods, so there might be some localization potential in lower-price segments. The tolling scheme of production of coffee-makers for the EU market in Ukraine in recent years proved to be quite successful (as was also the case with automotive wiring or parts for printing and copying machines in other markets). One could find opportunities for localization of export-oriented production in other household products as well. Also, the Deep and Comprehensive Free Trade Agreement with the EU has set the base import duty rate for most products in the subsector between zero to 2.7% with no transition period.

Subsector size



Source: State Statistical Service of Ukraine

Key export products, USD m



Source: ITC Trademap.

Note: we noticed a discrepancy between total export volumes of Household appliances in 2019 in the SSSU and ITC Trademap data. The SSSU data suggest total subsector export of 387 USD m. Most likely, electro-thermic coffee makers exported to Hungary (128 USD m) were not reflected in the national statistics, among others.

Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Hungary
Export: USD 278 m
CAGR 35%

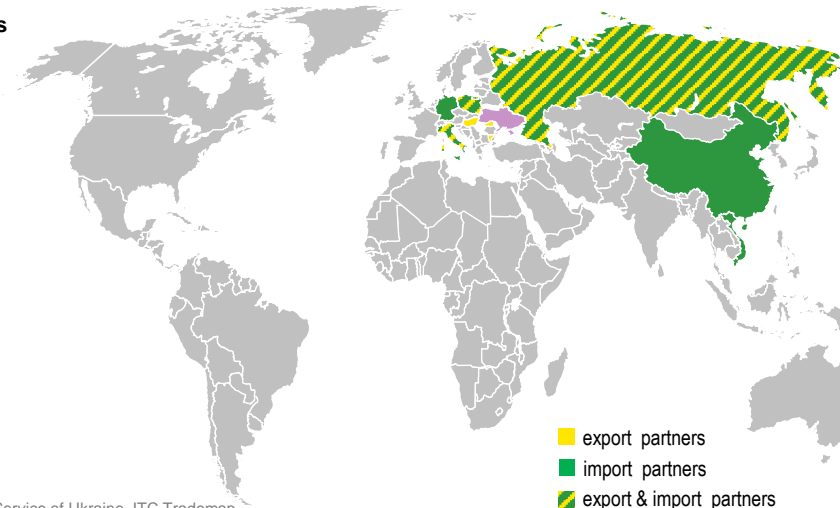
Poland
Export: USD 18 m
CAGR 90%

Russian Federation
Export: USD 16 m
CAGR -9%

World Total
Export: USD 515 m
CAGR 458%

Source: State Statistical Service of Ukraine, ITC Trademap

Note: due to statistical discrepancies, we use country export and import data from the State Statistical Service of Ukraine and total trade data from ITC Trademap.



TOP Import Partners

China
Import: USD 310 m
CAGR 27%

Russian Federation
Import: USD 54 m
CAGR 19%

Poland
Import: USD 43 m
CAGR 12%

World Total
Import: USD 760 m
CAGR 28%



2.4.4.1. Electronics. Electronics for work and life

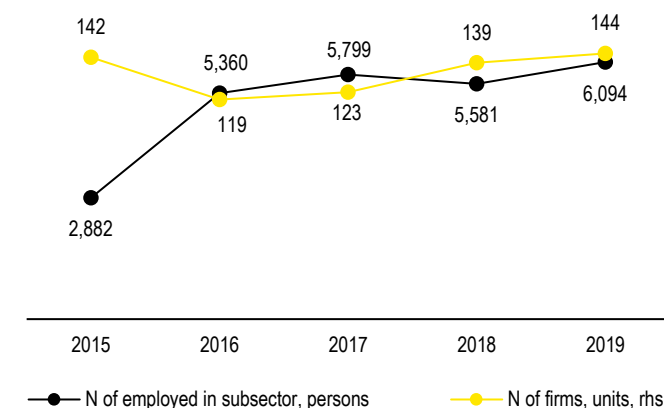
Ukraine's export of telecom equipment, namely parts of telephone sets and routers, is growing. Hungary is the main trade partner

The local commercial telecommunications equipment market is mainly divided by several large global players (Nokia, Ericsson, Huawei). At the same time, the consumer segment is primarily represented by cell phones, which are together responsible for half of the country's imports. The total subsector imports reached almost USD 1 bn in total in 2019.

Ukrainian companies selling telecommunications equipment after 2015 moved higher on the value chain. They replaced the once flourishing market for parts of transmission and reception apparatus (Hungary, Russia, Belarus) with the sales of ready transmission apparatus incl. routers and sales of parts for telephone sets. These segments are growing at a CAGR of 55% and 16%, respectively, supporting the general export volume of the subsector. The main market for Ukrainian goods is Hungary, where they are likely used for further delivery across Eastern Europe. American Jabil assembles communications equipment for global brands under contracts at their plants in the Zakarpattya region.

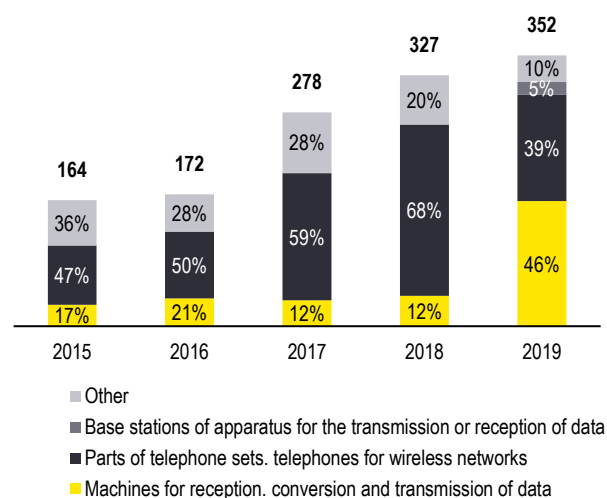
The segment is extremely concentrated, with flagman type of products occupying almost half of the market, which is also the case for the household appliances (coffee and tea making machines occupy over 2/3 of the total export). As a result, the sector is vulnerable to market disruptions.

Subsector size



Source: State Statistical Service of Ukraine

Key export products, USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

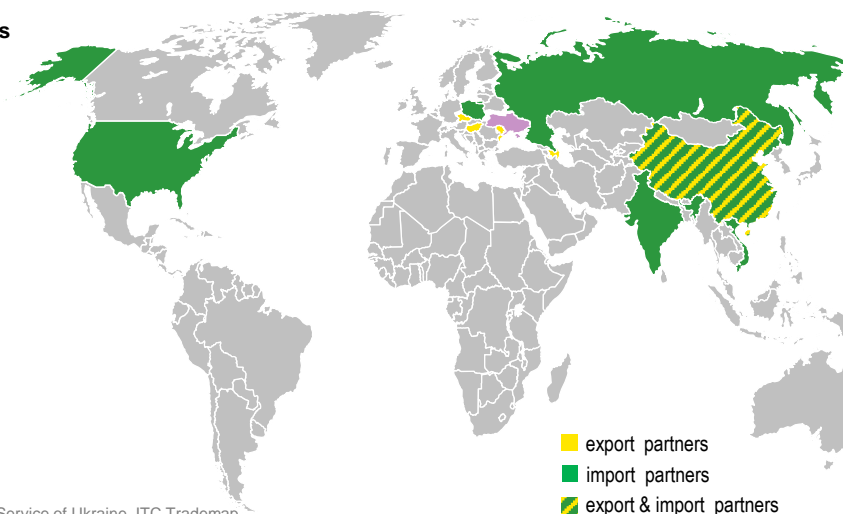
TOP Export Partners

Hungary
Export: USD 191 m
CAGR 13%

Moldova
Export: USD 40 m
CAGR 19%

China
Export: USD 5 m
CAGR 107%

World Total
Export: USD 352 m
CAGR 21%



TOP Import Partners

China
Import: USD 560 m
CAGR 10%

Vietnam
Import: USD 198 m
CAGR 14%

U.S.
Import: USD 65 m
CAGR 34%

World Total
Import: USD 914 m
CAGR 8%

Source: State Statistical Service of Ukraine, ITC Trademap

Note: due to statistical discrepancies, we use country export and import data from the State Statistical Service of Ukraine and total trade data from ITC Trademap.



2.4.4.1. Electronics. Electronics for work and life

Ukraine imports much more computers and peripheral equipment than exports. The subsectoral localization potential is not obvious

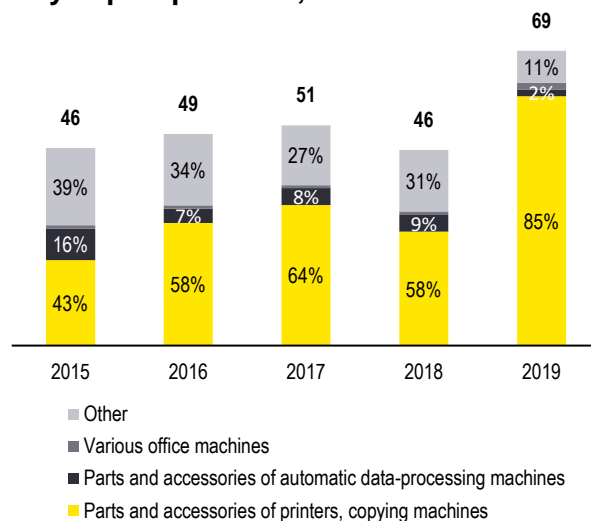
Export of computers and peripheral equipment amounts to under USD 70 m annually. The main product (85% of exports) is parts for printing and copying machines mainly sold to the Netherlands, the fourth largest exporter of printing machinery. The other large exporting countries in this segment are Japan, China, Hong Kong (China), Estonia, and Germany. The parts for printers and copying machines export volumes from Ukraine, likely under the tolling scheme on FDI plant, almost doubled since 2015, but still not enough to reach a significant level.

Ukraine's import of computers and equipment is ten times higher than export (USD 653 m vs USD 69 m in 2019). Mainly it is laptops and tablets (36% of imports), with China as the leading supplier. Locally produced Pixus, Impression, and MiXzo tablets and laptops are far behind global players like Asus, Samsung, Lenovo, Dell, HP, and others.

Ukraine also imports parts, units, and accessories for data-processing machines, including processing units and other hardware, and then PCs are assembled under different brands (Impression, Artline, QUBE, Everest, Vinga). Ukraine-based production of PC hardware is represented mainly by power units and cabinets (Vinga, CSV) and has overall weak positions in retail.

Local producers mention operating risks sourced from law-enforcement agencies as the reason to be careful with capital-intensive production of motherboards and other components in Ukraine.

Key export products, USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Netherlands
Export: USD 24 m
CAGR 4%

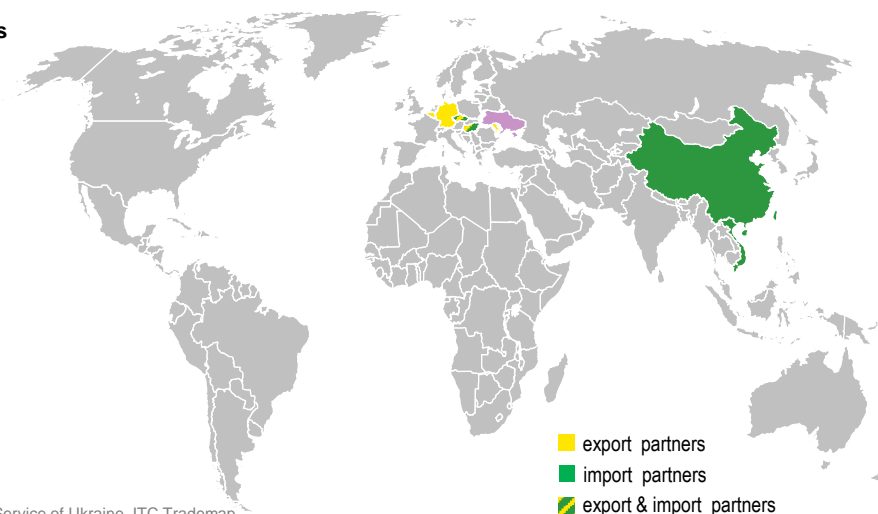
Czech Republic
Export: USD 4 m
CAGR 15%

Germany
Export: USD 3 m
CAGR -2%

World Total
Export: USD 69 m
CAGR 11%

Source: State Statistical Service of Ukraine, ITC Trademap

Note: due to statistical discrepancies, we use country export and import data from the State Statistical Service of Ukraine and total trade data from ITC Trade Map.



TOP Import Partners

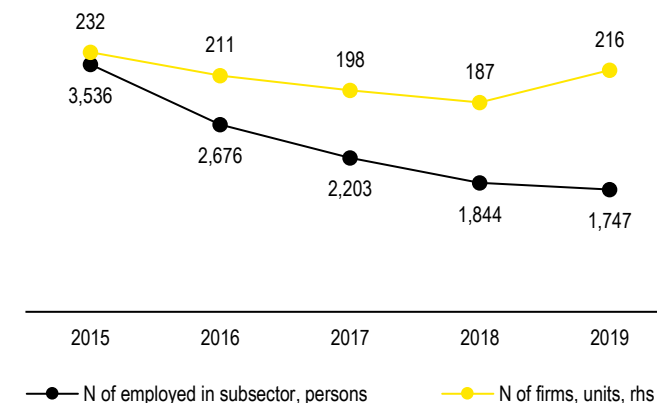
China
Import: USD 587 m
CAGR 19%

Taiwan
Import: USD 41 m
CAGR 31%

Czech Republic
Import: USD 34 m
CAGR 27%

World Total
Import: USD 653 m
CAGR 10%

Subsector size



Source: State Statistical Service of Ukraine



2.4.4.1. Electronics. Electronics for work and life

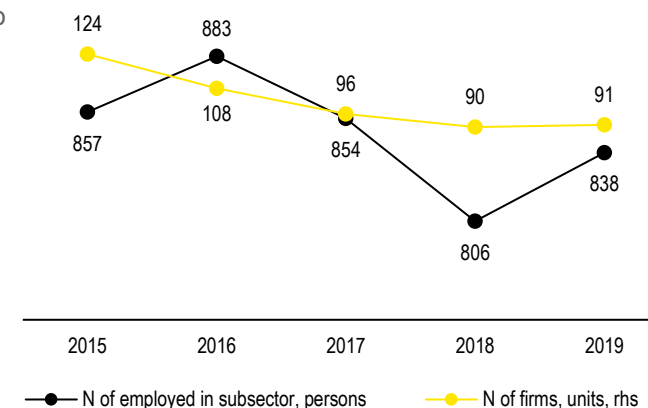
The global demand for MedTech is accelerating. Ukraine has the potential to integrate into Europe's chains by supplying parts of electromedical equipment

Comparatively small electronics segment MedTech is globally growing very fast (global trade CAGR at +6% and +26% CARG in imports to Ukraine from 2015 to 2019), with COVID accelerating the trend. Ukraine imports medical electrical appliances mainly from the EU (Germany, Italy, Poland) and China, and the main import categories are electrical instruments and appliances and X-ray apparatus. Ukrainian MedTech imports amount to USD 438 m annually (2019).

Export is negligible compared to imports and stands at USD 20 m (2019). Ukraine used to export many X-ray apparatus to the Russian Federation but lost this market in 2013. Russia remains among the major consumers, but on a much lesser scale, alongside the US, India, and Spain. Breathing appliances and gas masks also used to have Russia as the key market but shrunk in export volumes after 2015, and the exports expectedly coincided with the COVID-driven peak in local demand in 2020. Instruments and appliances, incl. dental drills, electro-diagnostics, etc., were sold to Germany, the Czech Republic, the Netherlands, Russia, and Indonesia.

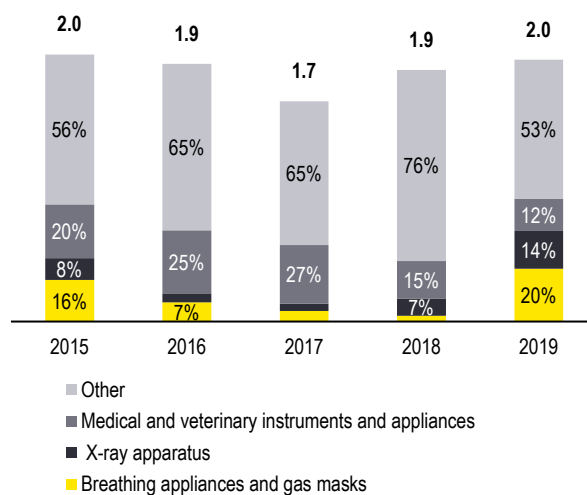
EU-based companies are strong players, which gives Ukraine the opportunity to become a supplier of parts of electromedical equipment, although this market is to be penetrated from scratch. The Deep and Comprehensive Free Trade Agreement with the EU may play along: import duties for most electromedical products have been liberalized, while for others, they do not exceed 2.1%. Some of the EU electromedical production companies already have computer soft developed in Ukraine; therefore, the country is already on their radars. Quality control should be the key because certification procedures for medical devices are rigorous.

Subsector size



Source: State Statistical Service of Ukraine

Key export products, USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Russian Federation

Export: USD 4 m
CAGR -5%

Germany

Export: USD 1 m
CAGR 6%

U.S.

Export: USD 1 m
CAGR -12%

World Total

Export: USD 20 m
CAGR -0.5%

TOP Import Partners

China

Import: USD 88 m
CAGR 26%

Germany

Import: USD 67 m
CAGR 36%

U.S.

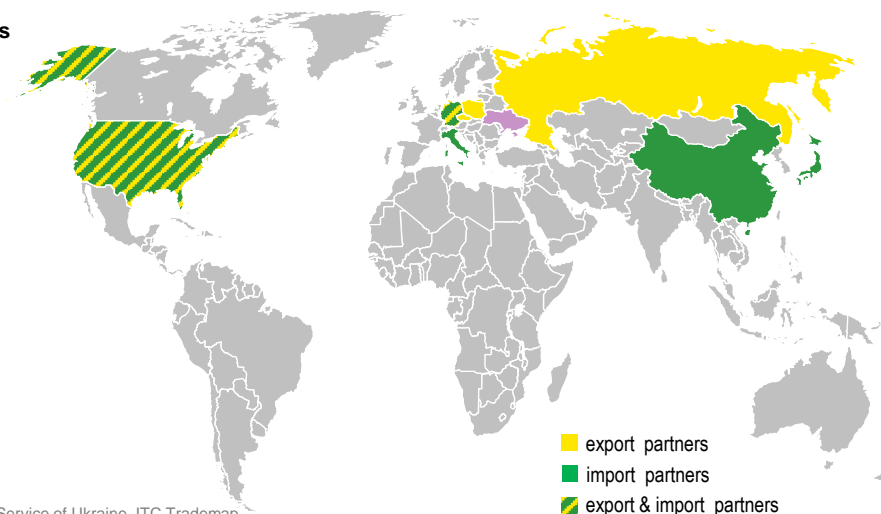
Import: USD 48 m
CAGR 22%

World Total

Import: USD 438 m
CAGR 26%

Source: State Statistical Service of Ukraine, ITC Trademap

Note: due to statistical discrepancies, we use country export and import data from the State Statistical Service of Ukraine and total trade data from ITC Trade Map.





2.4.4.1. Electronics. Electronics for work and life

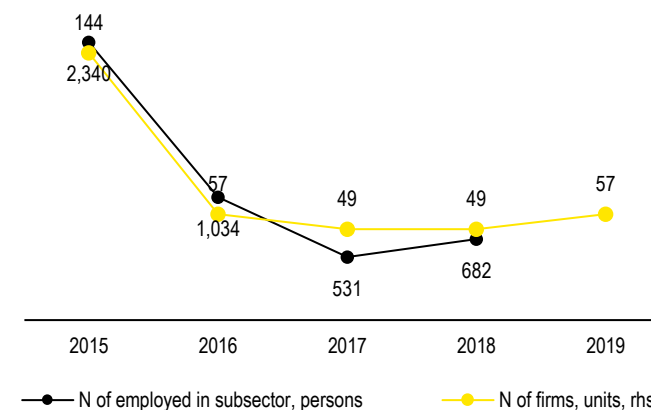
Ukraine imports TVs and exports TV set parts and other small audio & video equipment components. There is a strong potential for localization

The Ukrainian market for audio and video equipment is dominated by several largest retailers (Foxtrot, Eldorado, Comfy, Rozetka) with significant market power, focused on imported household appliances and TVs. In portable audio equipment and e-wearables segments, the retail network is broader, including smaller mobile phone shops. Local sales of Ukrainian brands at Foxtrot, for example, are estimated at ~10-12% in different segments, mainly low-price goods.

The TVs and audio segment is dominated by imports (USD 380 m in 2019, growing at CARG of 21% from 2015 to 2019). Major import products are TVs (over USD 200 m), mostly coming from China and Russia. In Russia, several global brands (LG, Sharp, Toshiba, etc.) assemble TVs domestically, which are then sold to Ukraine. This segment looks like a strong candidate for localization. However, there might be barriers to export-oriented production as not all import duties with the EU have been liberalized. For some products, the duty rates reach 14% with up to 7 years of the transition period.

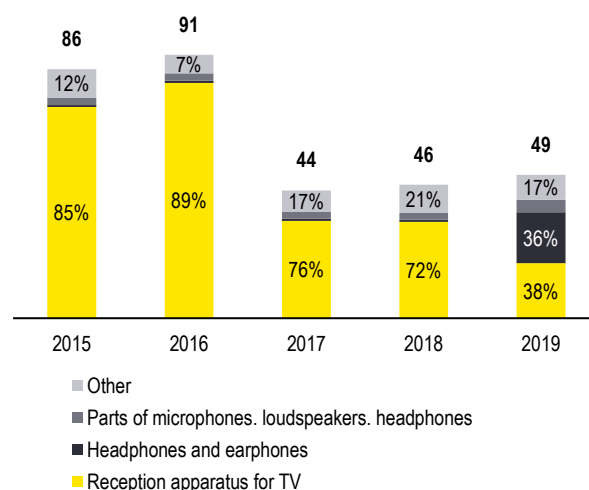
Export of TV sets from Ukraine was the leading position in the segment five years ago, focused on Hungary and Russia. Still, the volumes declined drastically after 2015, as well as the size of local companies. The subsector's total exports shrunk 7x compared to the average 2010-2015 volumes. Currently, Ukraine produces a small quantity of LED TV sets at Electron, Vinga, and Kindle Vision (KIVI TM). The products are exported to Estonia, Hungary, and the US. The recent most visible development in exports – a growth of the headphones and earphones, which are sold mainly to Hungary, but also Belgium and France.

Subsector size



Source: State Statistical Service of Ukraine

Key export products, USD m



Key trade partners in 2019, CAGR 2015-2019

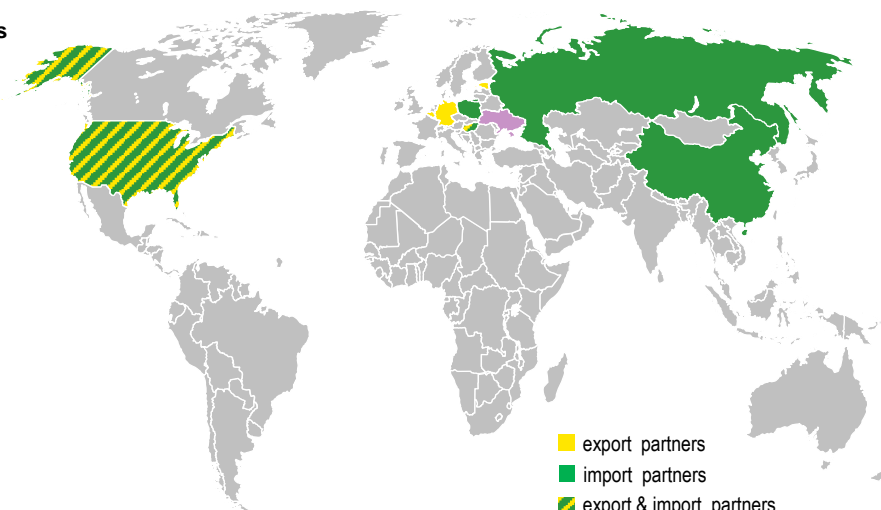
TOP Export Partners

Estonia
Export: USD 9 m
CAGR 14%

Hungary
Export: USD 9 m
CAGR -35%

U.S.
Export: USD 7 m
CAGR 9%

World Total
Export: USD 49 m
CAGR -13%



TOP Import Partners

China
Import: USD 222 m
CAGR 42%

Russian Federation
Import: USD 43 m
CAGR -14%

Hungary
Import: USD 23 m
CAGR 217%

World Total
Import: USD 380 m
CAGR 21%

Source: ITC Trademap

2.4.4.2. Electronics. Industrial electronics

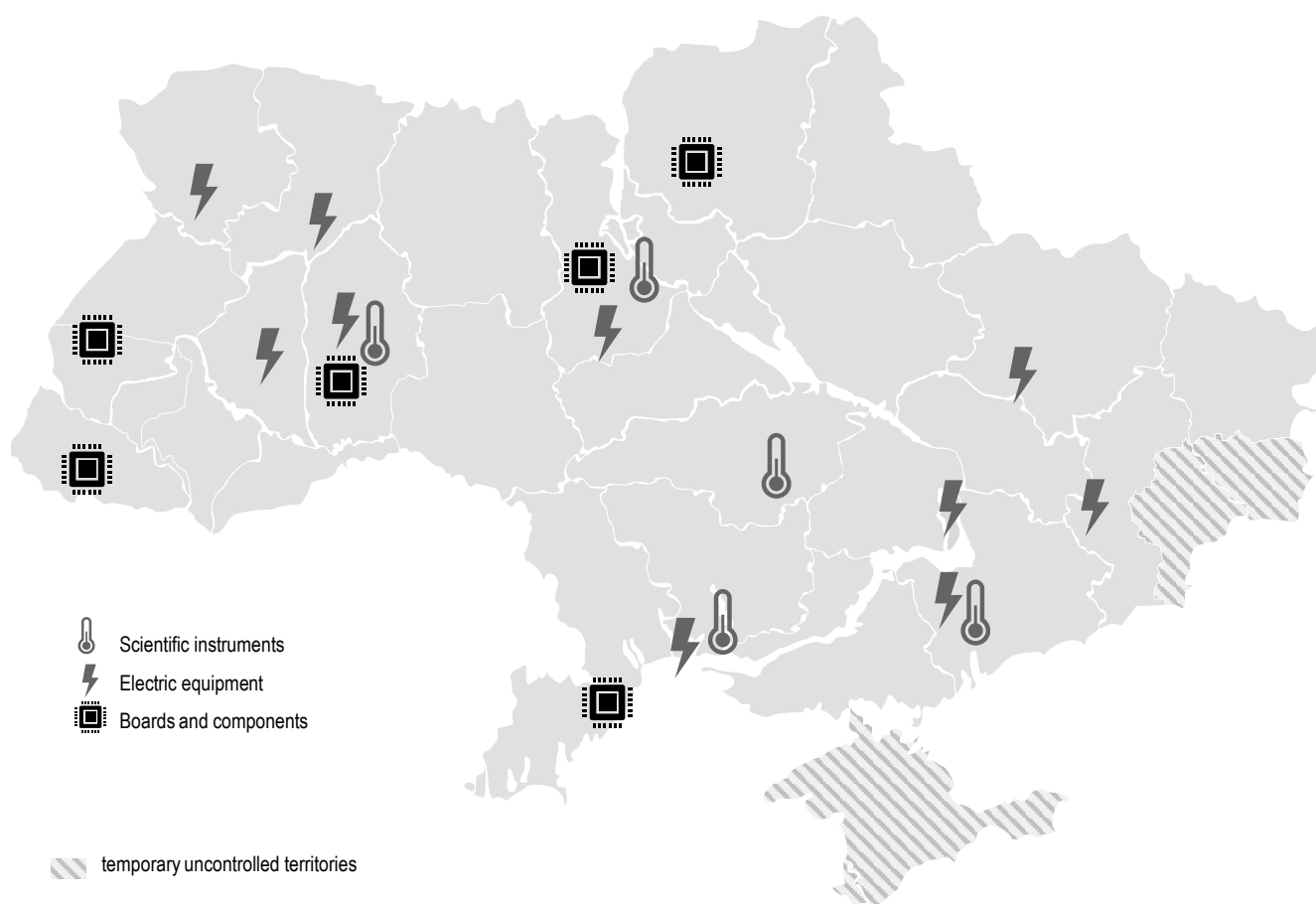




2.4.4.2. Electronics. Industrial electronics

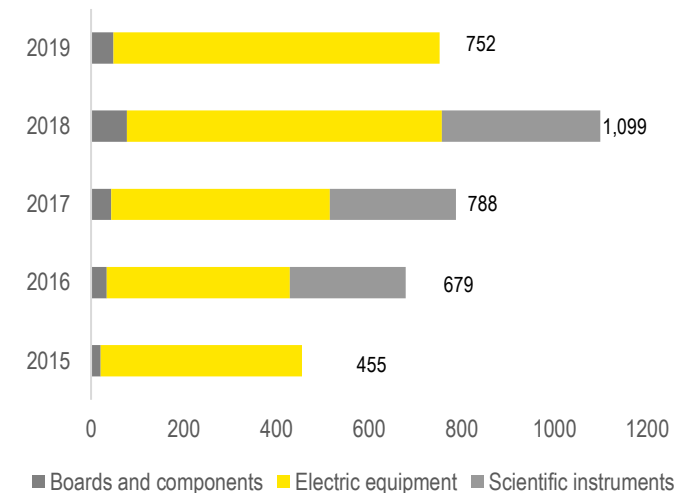
The production facilities of industrial tech are spread across the country in proximity to local industrial clients and potential buyers along the EU border

Industrial electronics production base in Ukraine



The industrial electronics production facilities are located close to industrial consumers in Eastern and South-Eastern Ukraine, close to the EU borders in the West, and large domestic logistics and production hubs (Kyiv, Khmelnytskyi, Odesa).

Subsector sales, USD m



Source: State Statistical Service of Ukraine

Note. Data on Scientific instruments sales in 2015 and 2019 are not available. The discrepancy between sales and export volumes is due to the facts that (1) Ukrainian NACEs are assigned based on company's main economic activity, which does not necessarily reflect its export-oriented production; (2) tolling schemes: only production costs are counted towards sales, but not raw materials costs, whereas total costs are counted towards export volumes.

Major players

radiy JABIL

SEA

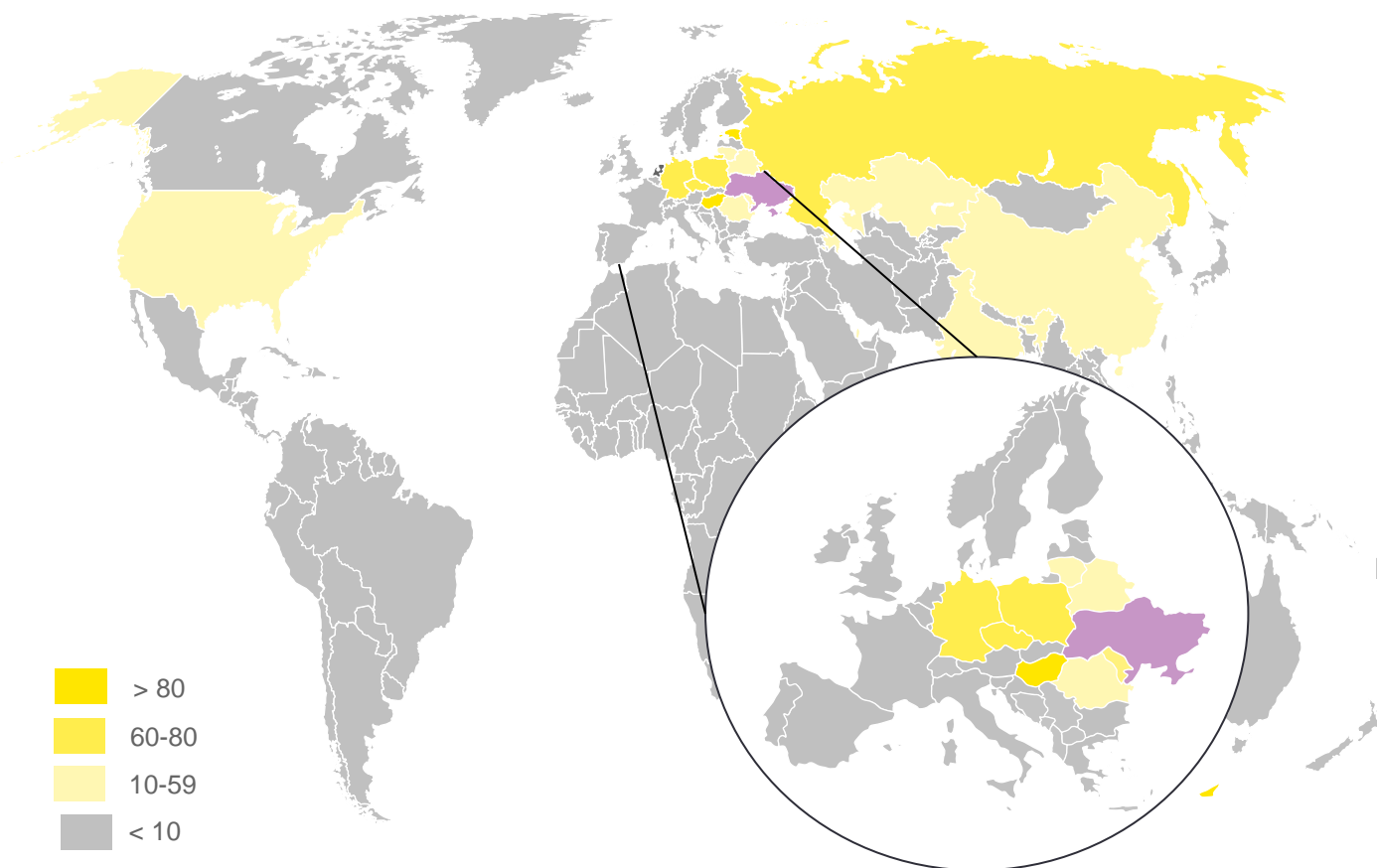
ХИМЛАБОРРЕАКТИВ

ИКТ



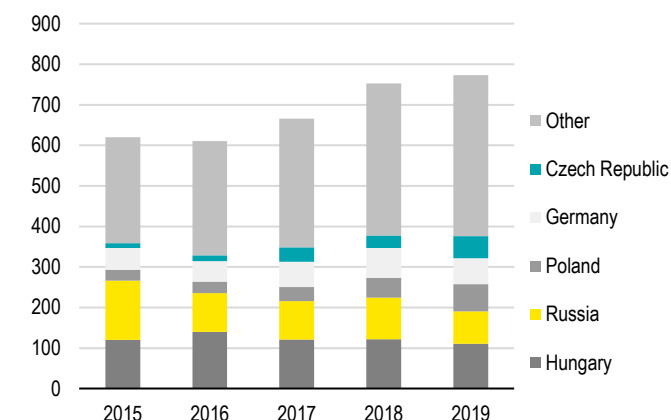
2.4.4.2. Electronics. Industrial electronics

Industrial tech export partners are concentrated in Eastern Europe, where Ukraine supplies large volumes of electric equipment



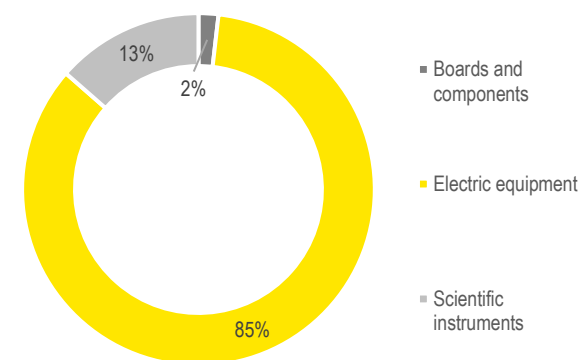
Main export destinations for Ukrainian industrial electronics are Hungary, the Czech Republic, and Poland (in Eastern Europe), and Russia, where some of the post-soviet value chains remain intact for several products clusters (electrodes, cables, controlling and measuring instruments, heaters, boards, and panels, etc.). Germany is the destination for optical fibres, some of the electrical apparatus and wires (mostly for automotive, as stated in the respective subsection, but also for general purposes).

Export by country, USD m



Source: State Statistical Service of Ukraine, ITC Trademap

Export structure by subsector, USD m

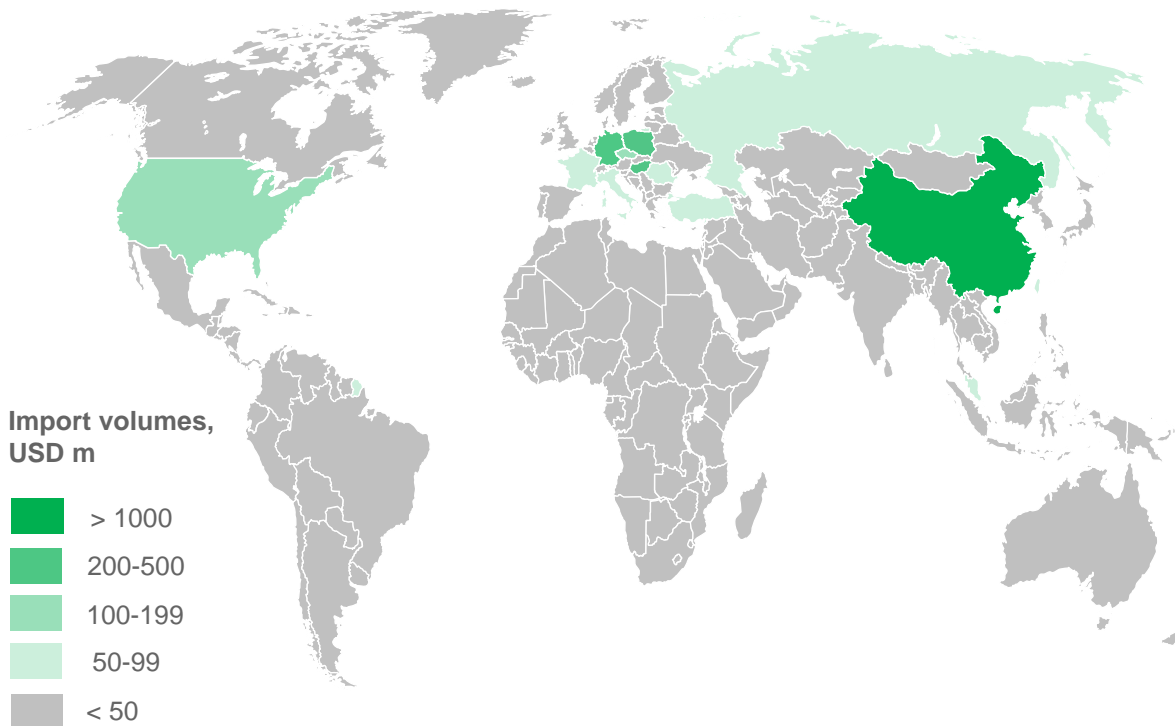


Source: ITC Trademap

2.4.4.2. Electronics. Industrial electronics

Ukraine imports small electric components (wires, fittings) from Eastern Europe that could be produced locally where natural resources are available

Import heat map



Total Ukrainian imports of industrial electronics amount to USD 3.3 b. From the TOP-5, imported goods by volume semiconductors (including the largest segment – solar panels) are produced in China. They are unlikely candidates for localization as the components industry there keeps the global leadership with sizeable economies of scale. Besides, the problems with the green tariff for electricity in Ukraine might lead to a domestic demand decline.

However, other goods (wires, fittings, switchers, etc.) are mainly imported from Eastern Europe, where the segment's imports are then likely used for car electric wires production higher up the value chain. It means that the localization of some share of these products is possible and subject to the availability of raw materials such as non-ferrous metals and plastic.

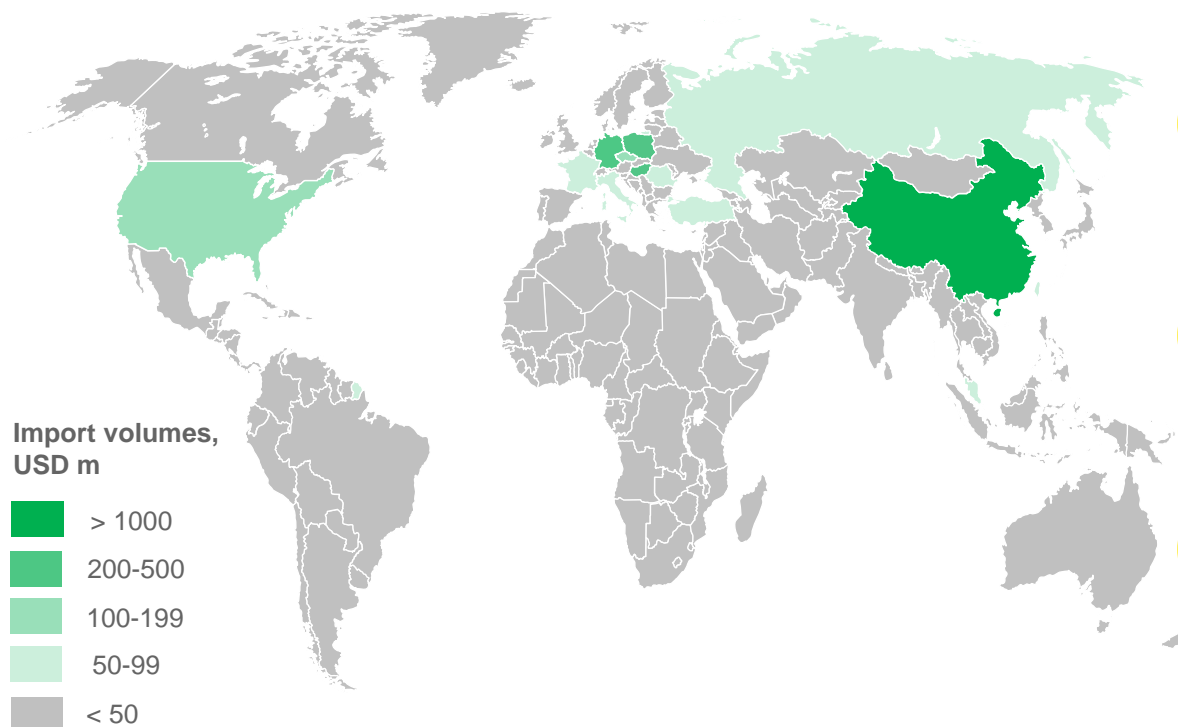
TOP-5 largest from imported goods

	Semiconductors (incl. solar panels)	Suppliers
	Volume in 2019: USD 966 m CAGR 2015-2019: 149%	China – 95% Turkey– 2% Hungary – 1%
	Electric wires and cables (without connectors)	Suppliers
	Volume in 2019: USD 251 m CAGR 2015-2019: 7%	Hungary – 35% Romania – 19% Poland – 17%
	Insulating fittings (plastic)	Suppliers
	Volume in 2019 : USD 163 m CAGR 2015-2019: 6%	Hungary – 51% Romania – 16% Poland –13%
	Electric wires and cables (with connectors))	Suppliers
	Volume in 2019 : USD 158 m CAGR 2015-2019: -1%	Poland – 35% Hungary – 32% Romania– 12%
	Electrical switchers and connectors	Suppliers
	Volume in 2019 : USD 123 m CAGR 2015-2019: 1%	Hungary – 34% Poland– 22% Germany– 16%

2.4.4.2. Electronics. Industrial electronics

The domestic demand for boards and components and scientific instruments is growing, which are the natural candidates for localization

Import heat map



The total import of industrial electronics was growing at 21% CAGR in 2015-2019. In some segments, the growth exceeded this pace, which might indicate the domestic demand increase and, therefore, new local production opportunities.

Semiconductors imported from China are not only the largest segment but also growing very fast, but they are an unlikely candidate for localization, as stated on the previous slide. However, Ukraine could potentially be competitive in high-voltage boards and cabinets and carbon electrodes. Parts for measuring machines imported from the EU countries are then used to produce goods higher up the value chain. The physical or chemical analysis apparatus market, however, could potentially be interesting for local producers of precision equipment if they manage to raise their quality standards to those of the US and Germany (the biggest suppliers).

TOP-5 fastest-growing from TOP-30 largest imported goods

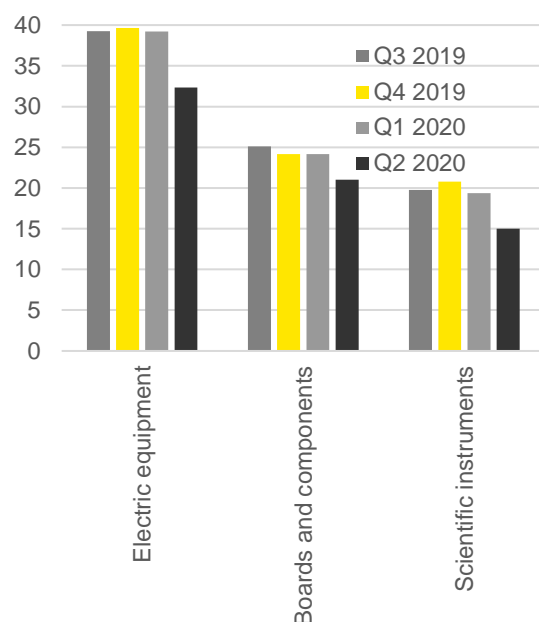
	Semiconductors Volume in 2019: USD 966 m CAGR 2015-2019: 149%	Suppliers China – 95% Turkey – 2% Hungary – 1%
	Boards and cabinets (for a voltage > 1.000 V) Volume in 2019: USD 48 m CAGR 2015-2019: 68%	Suppliers Germany – 36% Turkey – 18% Korea – 16%
	Carbon electrodes for electric furnaces Volume in 2019: USD 38 m CAGR 2015-2019: 39%	Suppliers Russia – 31% China – 29% Lithuania – 24%
	Parts for measuring machines Volume in 2019: USD 19 m CAGR 2015-2019: 36%	Suppliers Germany – 25% Hungary – 24% France – 7%
	Physical or chemical analysis apparatus Volume in 2019 : USD 20 m CAGR 2015-2019: 33%	Suppliers Germany – 29% USA – 14% China – 7%



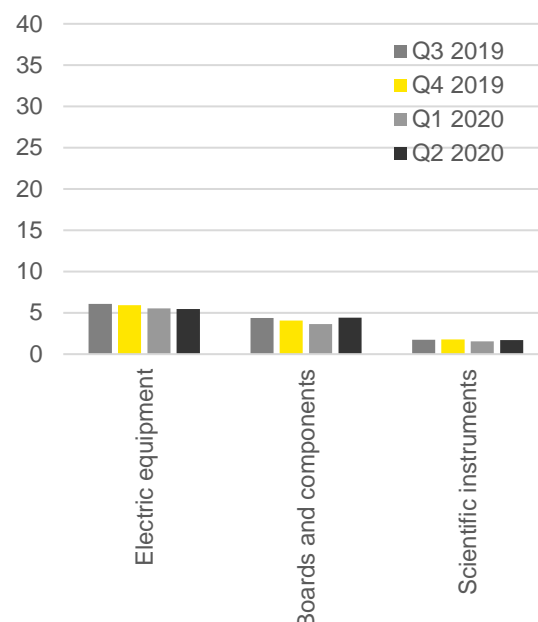
2.4.4.2. Electronics. Industrial electronics

Europe does not rely heavily on China's supplies of industrial electronics, however, near-shoring opportunities for Ukraine here are not evident

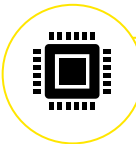

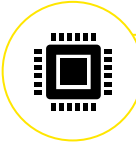
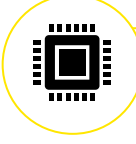
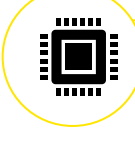
EU 28 imports from world, USD b



EU 28 imports from China, USD b



TOP-5 goods with the largest share of China's imports among the TOP-30 goods by volume imported by EU from China

	Diode LED lamps Import from world in 19Q3 – 20Q2: USD 2.2 b	China's share Share – 65% Volume 19Q3 – 20Q2: USD 1.5 b
	Portable electrical lamps Import from world in 19Q3 – 20Q2: USD 0.8 b	China's share Share – 55% Volume 19Q3 – 20Q2: USD 0.4 b
	Semiconductors Import from world in 19Q3 – 20Q2: USD 13 b	China's share Share – 51% Volume 19Q3 – 20Q2: USD 6.7 b
	Liquid crystal devices Import from world in 19Q3 – 20Q2: USD 1.1 b	China's share Share – 48% Volume 19Q3 – 20Q2: USD 0.5 b
	Printed circuits Import from world in 19Q3 – 20Q2: USD 7.4 b	China's share Share – 45% Volume 19Q3 – 20Q2: USD 3.3 b

In the industrial electronics segment, China is not the monopoly trade partner for the EU, as seen in the diagrams above. There are products where China's share is significant, amounting to half of the market. These are LED lamps, portable lighters, and printed circuits, where Ukraine can try to win the market share, and there are also semiconductors and liquid crystal devices, where we are sceptical about Ukraine's ability to substitute China.

2.4.4.2. Electronics. Industrial electronics

Ukraine's electric equipment subsector is strong both in terms export and local production capacities and could be expanded further

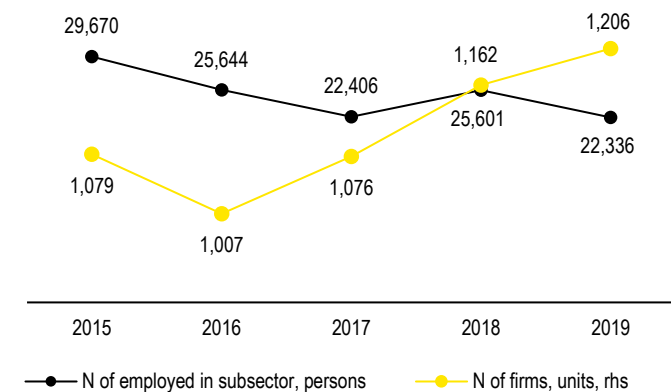
Export and import in this subsegment are fragmented both in terms of products and partner countries. The demand for electric equipment comes from different firms for different purposes, and Ukraine has a well-established production base, servicing local electricity and machinery sectors. It is also the primary subsector in electronics by export volumes (USD 654 m in 2019), having clients in many countries. The export growth was relatively strong at 9.7% annually in 2015-2019.

Import is still 3x larger, with the main import products being electric conductors, insulating switches, boards and cabinets, etc. In this segment, China does not have a monopoly as in boards, and components, and Ukraine buys electric equipment in considerable volumes also from Germany, Hungary, Poland and the Czech Republic.

The local market is very fragmented. Since most of the goods are not technology-intensive in production, many companies produce and sell them locally. The most significant players are Aquatica (pumps), Atmosfera (energy saving technologies), Bilmax (electrotechnics), Ekvives (electric engines for the industry), Promfactor, and Ukrtehnologia (electric goods), Turkish ERKA (cabinets, wires, other electrical equipment). The range of products is comparatively wide.

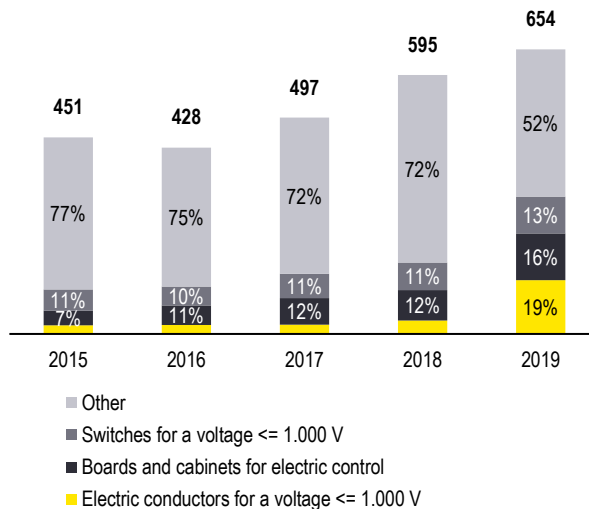
The subsector-specific trend, which might increase its attractiveness, is the rise of the energy efficiency era and therefore increase the demand in Ukrainian and European markets.

Subsector size



Source: State Statistical Service of Ukraine

Key export products, USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

TOP Export Partners

Hungary
Export: USD 91 m
CAGR -4%

Poland
Export: USD 62 m
CAGR 30%

Germany
Export: USD 60 m
CAGR 6%

World Total
Export: USD 654 m
CAGR 10%

TOP Import Partners

China
Import: USD 392 m
CAGR 29%

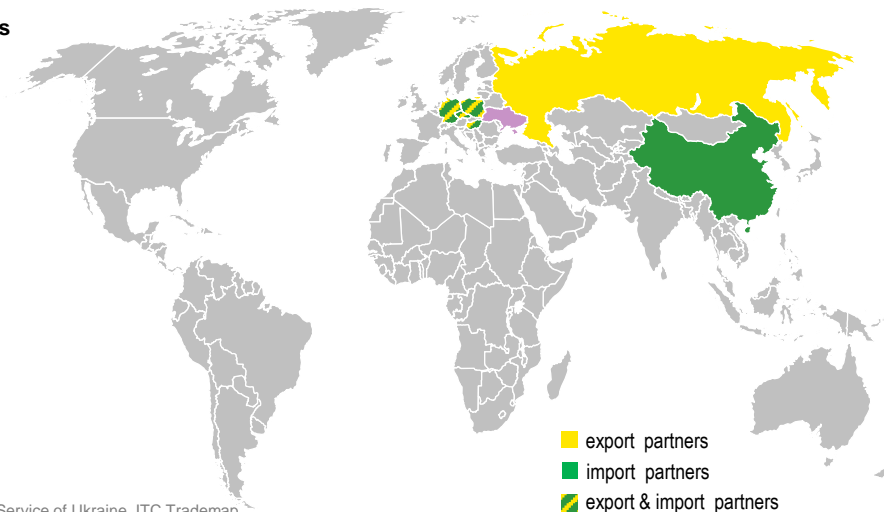
Germany
Import: USD 303 m
CAGR 9%

Hungary
Import: USD 236 m
CAGR 6%

World Total
Import: USD 1,723 m
CAGR 12%

Source: State Statistical Service of Ukraine, ITC Trademap

Note: due to statistical discrepancies, we use country export and import data from the State Statistical Service of Ukraine and total trade data from ITC Trademap.



2.4.4.2. Electronics. Industrial electronics

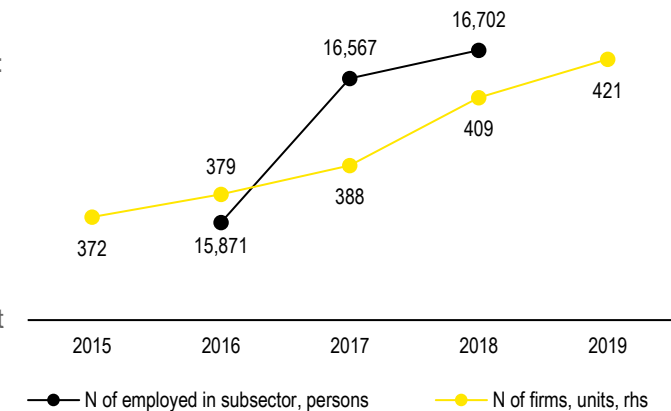
Ukraine's export and import of various scientific instruments is small yet diversified, creating a potential for local niche high-tech production

Compared to the other subsectors, scientific instruments export is not very sizeable (USD 105 m) and declining steadily. It was shrinking at 8% annually in 2015-2019. In 2019, export was 4x lower than import (USD 404 m). The export of regulating or controlling instruments is focused on the Czech Republic (USD 12 m) and Russia (USD 6 m). The market is quite diversified, and Ukraine also exports a wide range of other scientific instruments: measurement instruments are shipped to Russia (USD 3 m) and Vietnam (USD 1.6 m); lasers – to Belgium (USD 6 m); radars – to the US (USD 4.5 m) and Turkey; benches for testing motors – to Lithuania and Russia.

Globally the segment is growing at a decent pace – at a CAGR of 4%, and Ukrainian import is growing even faster – at 13% annually in 2015-2019. The main trade partners are the US, Germany, China. The import is also diversified, with regulating, measurement, chemical analysis instruments leading.

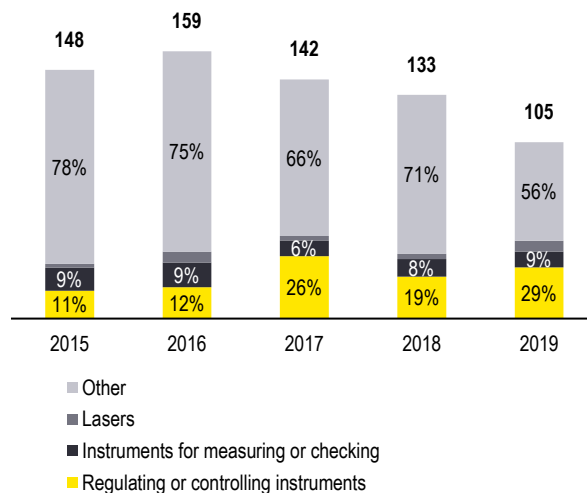
As we see from the growth in import and local employment, the domestic demand for scientific instruments is increasing. The small subsectors' size and the diversification of the products might play well for Ukraine, where it is much easier to create from scratch a small-scale high-quality niche production. It is also a promising field for tech startups.

Subsector size



Source: State Statistical Service of Ukraine

Key export products, USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

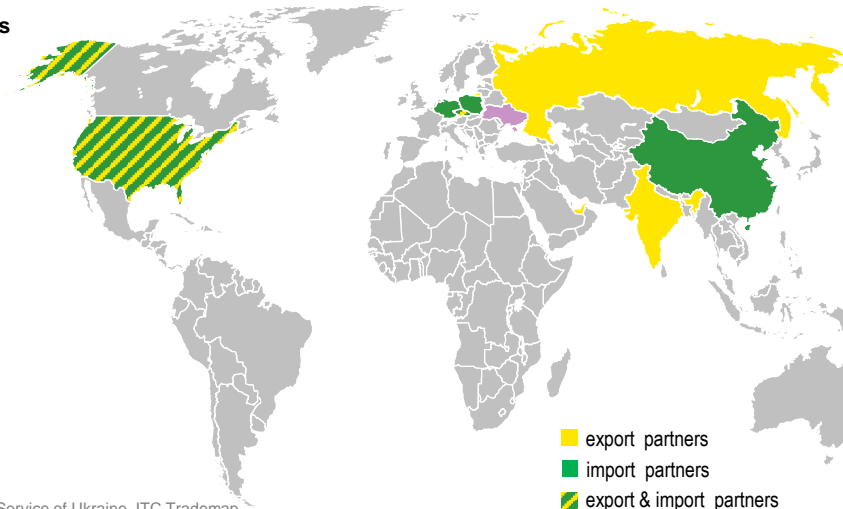
TOP Export Partners

Russian Federation
Export: USD 20 m
CAGR -12%

Czech Republic
Export: USD 15 m
CAGR 92%

Qatar
Export: USD 10 m
CAGR 395%

World Total
Export: USD 105 m
CAGR -8%



Source: State Statistical Service of Ukraine, ITC Trademap

TOP Import Partners

U.S.
Import: USD 75 m
CAGR 12%

Germany
Import: USD 64 m
CAGR 8%

China
Import: USD 60 m
CAGR 29%

World Total
Import: USD 404 m
CAGR 13%

Note: due to statistical discrepancies, we use country export and import data from the State Statistical Service of Ukraine and total trade data from ITC Trademap.



2.4.4.2. Electronics. Industrial electronics

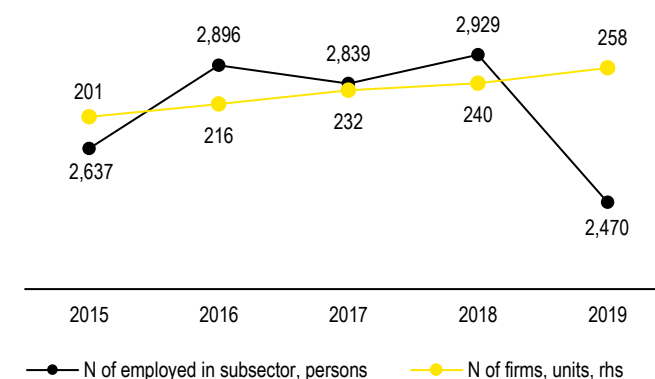
The local production of boards and components in Ukraine is low-tech. Qualified labor pool is subsector's main competitive advantage

China is the main global production hub for boards and components. Its competitive advantage is in massive production scale and proximity of production to assembling plants, which allows cutting costs for storage and order details on an as-needed basis. Including Hong Kong, China occupies 30-50% of global imports in each sub-segments (solar panels, diodes, other semiconductors, transistors, integrated circuits, other boards, and components). The trend of moving production facilities closer to the EU borders might reduce the country's overwhelmingly high market share. Still, cost economy is a potent stimulus, and the near-shoring trend might not last long.

After 2015, Ukraine lost the Russian market, and before that, in 2010, several developed countries (Switzerland, France, Canada), which used to buy Ukrainian components, switched to other producers.

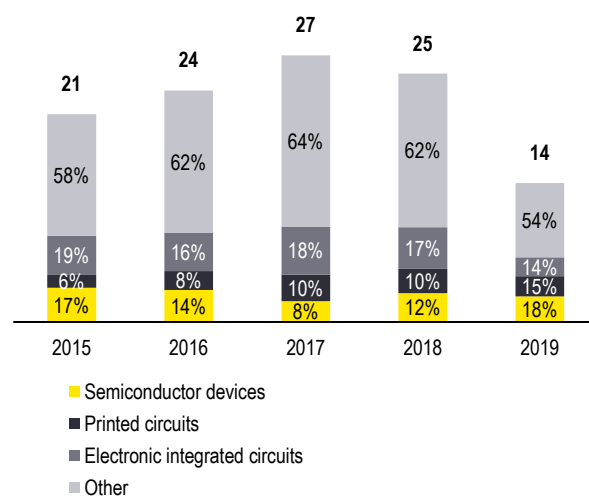
Except for the US, Jabil, and Flex (contractual suppliers of electronics for global brands), in Ukraine, boards and components are produced mainly at the facilities inherited from the post-soviet enterprises (Electron, Nominal, Saturn, Mayak, Tira), which used to supply for military and aerospace. Their main problem is the low level of automatisations as Ukraine's industry was underinvested for decades. At the same time, global players were equipped with industrial robots, climate controls, and precision instruments. The main advantage of Ukraine is its qualified engineers and cheap labour.

Subsector size



Source: State Statistical Service of Ukraine

Key export products, USD m



Source: ITC Trademap

Key trade partners in 2019, CAGR 2015-2019

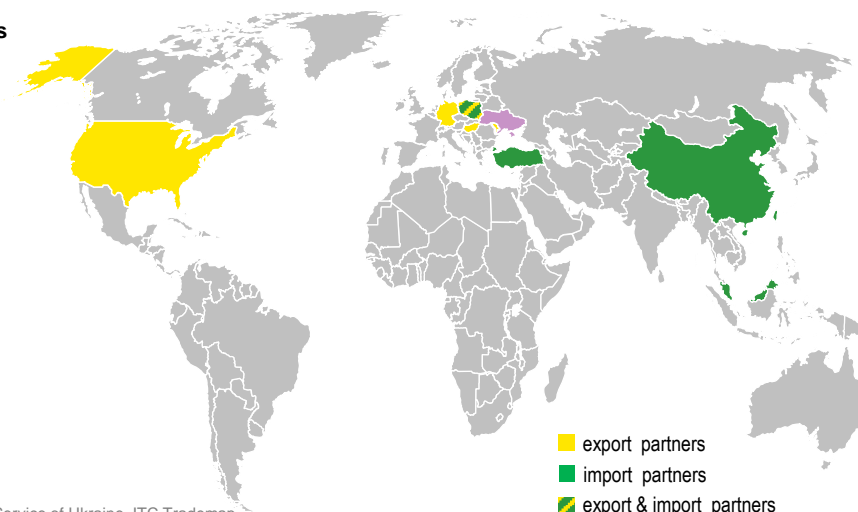
TOP Export Partners

Hungary
Export: USD 16 m
CAGR 33%

U.S.
Export: USD 3 m
CAGR 39%

Poland
Export: USD 2 m
CAGR 162%

World Total
Export: USD 14 m
CAGR -10%



TOP Import Partners

China
Import: USD 1308 m
CAGR 97%

Taiwan
Import: USD 48 m
CAGR 15%

Malaysia
Import: USD 36 m
CAGR 16%

World Total
Import: USD 1,200 m
CAGR 53%

Source: State Statistical Service of Ukraine, ITC Trademap

Note: due to statistical discrepancies, we use country export and import data from the State Statistical Service of Ukraine and total trade data from ITC Trademap.

2.4.5. Legal framework



2.4.5. Legal framework

International legal framework

Association Agreement between the European Union and Ukraine (AA) and Plan of Measures for Implementation of the Association Agreement approved by Resolution of the CMU No. 1106 dated 25 October 2017

- ▶ The administrative and institutional reforms should be done to implement this Agreement and the **Agreement on Conformity Assessment and Acceptance of Industrial Goods (ACAA)**. Ukrainian legislation should be in conformity with EU technical regulations and EU standardization, metrology, accreditation, conformity assessment procedures, and the market surveillance system. In 2019 the Parties confirmed their mutual commitment to conduct the preliminary assessment of adaptation of Ukrainian legislation to EU standards to **establish “industrial visa-free regime” in three priority sectors**:
 - ▶ **Low voltage equipment**
 - ▶ **Electromagnetic equipment**
 - ▶ **Machines and mechanisms**
- ▶ The Mineconomy stated that Ukraine adopted necessary technical sectoral regulations in the priority sectors. In October 2020 EU preliminary assessment mission launched its work. Therefore, starting from 1 January 2021, the trade conditions with the EU may be reviewed, and the ACAA for the above sectors can be executed as a Protocol to the Association Agreement
- ▶ Execution of the ACAA enables mutual recognition of conformity certificates between Ukraine and the EU, which allows the trade of respective groups of Ukrainian products in the EU internal market without additional testing and conformity assessment procedures. Parties will execute ACAA as a Protocol to the Association Agreement after they are in agreement that the relevant Ukrainian sectoral and horizontal legislation, institutions, and standards have been fully aligned with those of the EU. The ACAA would cover one or more sectors listed in Annex III to the Association Agreement
- ▶ *Approximation with EU legislation.* Compliance with European standards implies a presumption of conformity of products, related processes, or production methods with the requirements of technical regulations in the priority sectors of the ACAA. Ukraine has implemented the provisions of the EU horizontal legislation, in particular:
 - ▶ Directive 2001/95/EC on general product safety (implemented by Law of Ukraine "On the General Safety of Non-Food Products" and Law of Ukraine "On State Market Supervision and Control of Non-Food Products")
 - ▶ Decision No 768/2008/EC on a common framework for the marketing of products, (implemented by Law of Ukraine "On Technical Regulations and Conformity Assessment")
 - ▶ Directive 98/6/EC on consumer protection in the indication of the prices of products offered to consumers (most provisions were implemented by Law of Ukraine "On Consumer Rights Protection")
 - ▶ Directive 2005/29/EC concerning unfair business-to-consumer commercial practices in the internal market (implemented by Law of Ukraine "On Metrology and Metrological Activity")
 - ▶ Regulation (EU) No 1025/2012 on European standardization (implemented by Law of Ukraine "On Standardization")
 - ▶ Regulation (EC) No 765/2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (implemented by Law of Ukraine "On Accreditation of Conformity Assessment Bodies" and Law of Ukraine "On State Market Supervision and Control of Non-Food Products")
 - ▶ Decision No 768/2008/EC on a common framework for the marketing of products (implemented by Law of Ukraine "On State Market Supervision and Control of Non-Food Products")
- ▶ At the same time, certain sectoral legislation in Ukraine should be still approximated with the *EU acquis*, including:
 - ▶ Regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery until 31 December 2020 with prolongation (partially implemented)
 - ▶ Council Directive 92/6/EEC on the installation and use of speed limitation devices for certain categories of motor vehicles in the Community until 31 December 2020 (certain provisions were implemented)

2.4.5. Legal framework

International legal framework

- ▶ Association Agreement (AA) outlines the principles of a free market economy for relationships between the Parties. The Parties should progressively establish a free trade area within 10 years. Each Party should reduce or eliminate customs duties on originating goods of the other Party in accordance with the Schedules set out in Annex I-A ('Schedules') of the AA. The base rate of customs duties to which reductions are applied is specified in Annex I of the Association Agreement
 - ▶ The AA says that in case a Party reduces its applied favoured nation customs duty rate, such duty rate should apply as a base rate if and for as long as it is lower than the customs duty rate calculated in accordance with that Party's Schedule
 - ▶ The **Deep and Comprehensive Free Trade Agreement (DCFTA)** has been applied since 1 January 2016 as part of the Association Agreement. It has zero customs and import duties for a number of goods and establishes the relevant transitional periods to reach zero rate duties (not later than 2023)
 - ▶ Tariff schedules of AA ([part 2 of Annex I-A](#)) and ([part 1 of Annex I-A](#)) set out the codes, base rates, and staging category for goods exported from Ukraine into the EU. In particular, customs duties for products exported from Ukraine to the EU are as follows:
 - ▶ The majority of top-30 exported **electrical machinery, equipment, and its parts as well as components of vehicles** — exempted from customs duties starting from 2016 (rate is 0%)
 - ▶ **Passenger cars (cars with electric motors)** — [3.7%](#) in 2020 and [2.5%](#) in 2021 (falling from 10% to 0% during 2016-2023)
 - ▶ [The Protocol 1](#) to the Association Agreement defines products considered as originating in the EU/Ukraine as products wholly obtained in the EU/Ukraine or products obtained in the EU/Ukraine incorporating materials which have not been wholly obtained there, provided that such materials have undergone sufficient working or processing in the EU/Ukraine
 - ▶ [The Regional Convention on Pan-Euro-Mediterranean Preferential Rules of Origin](#) (ratified by [Law No. 2187-VIII dated November 2017](#)) is also applied to determine the origin of goods in accordance with the Council Decision of 26 March 2012
 - ▶ To apply for the preferential export duty to the EU, the value of components with Ukrainian or EU origin should make 60% of the car price, which [is not yet achievable](#) by the local Ukrainian car manufacturers
 - ▶ **Regulation (EU) 2018/858 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components, and separate technical units intended for such vehicles**
 - ▶ Lays down provisions and technical requirements for the type-approval and placing on the market of all new wheeled vehicles, systems, components, and separate technical units
 - ▶ Says that wheeled vehicles are subject to market surveillance and conformity certification
 - ▶ Certain provisions were implemented in the [Procedure for approval of the design of vehicles, their parts and equipment approved by Order of the MIU No. 521 dated 17 August 2012](#)
 - ▶ **Agreement concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations dated 20 March 1958 (ratified on 10 February 2000)** provides that Parties agreed on progressive adoption of unified requirements and regulations for wheeled vehicles, equipment and parts that may be installed into/onto vehicles or used on them
- Electronics industry*
- ▶ **Directive [2009/125/EC](#) establishing a framework for the setting of ecodesign requirements for energy-related products**
 - ▶ Defines an 'energy-related product' (a 'product') as any good that has an impact on energy consumption
 - ▶ Says that a 'CE' marking should be affixed by and an EC declaration of conformity issued before a product is placed on the market and/or put into service
 - ▶ Provides that Parties should designate the authorities responsible for market surveillance
 - ▶ These principles were incorporated into certain technical regulations, particularly regulations [on Ecodesign of Washing Machines \(Resolution of CMU No. 738 dated 14 August 2019\)](#), [Ecodesign of Dishwashing Machines \(Resolution of CMU No. 736 dated 14 August 2019\)](#), [Ecodesign of Water Heaters and Accumulation Tanks \(Resolution of CMU No. 740 dated 14 August 2019\)](#)

2.4.5. Legal framework

International legal framework

Commission Regulation (EU) No 617/2013 implementing Directive 2009/125/EC with regard to ecodesign requirements for computers and computer servers

- ▶ Defines 'computer' as a device which performs logical operations and processes data, is capable of using input devices and outputting information to a display, and normally includes a central processing unit (CPU) to perform operations and criteria for types of computers
- ▶ Establishes ecodesign requirements for placing computers and computer servers on the market (Annex II) and compliance methods for ecodesign requirements (Annex III), as well as indicative benchmarks for best-performing products and technology (Annex IV)
- ▶ Most provisions were implemented in Technical Regulation of Requirements on Ecodesign of Computers and Computer Servers (Resolution of CMU No. 737 dated 14 August 2019)

Commission Regulation (EC) No 642/2009 implementing Directive 2005/32/EC with regard to ecodesign requirements for televisions

- ▶ Defines 'television set' as a product designed primarily for the display and reception of audiovisual signals which is placed on the market under one model or system designation, and which consists of a display and TV tuner(s), other optional additional functions for data storage and/or display
- ▶ Establishes ecodesign requirements for placing TV sets on the market to display on an integrated screen a video signal from a variety of sources
- ▶ Provides for surveillance checks carried out in accordance with the relevant verification procedure (Annex III)
- ▶ Most provisions were implemented in the Technical Regulation of Requirements on Ecodesign of Televisions, approved by Resolution of CMU No. 735 dated 14 August 2019

Directive 2014/35/EU on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits

- ▶ Applies to electrical equipment designed for use with a voltage rating of 50-1,000V for alternating current and 75-1,500V for direct current (except equipment in Annex II). The electrical equipment may be available on the EU market if it was constructed in accordance with good EU engineering practice and does not endanger the health and safety of persons or property

- ▶ Parties should not impede electrical equipment compliant with this Directive to be available on the market. The electricity supply bodies should not set stricter safety requirements for connection to the grid or for the supply of electricity to users than the safety objectives established in the Directive (in particular, the electrical equipment should ensure safely and properly assembled and connected, as well as protection against the relevant hazards)
- ▶ Says that manufacturers should ensure that their electrical equipment has been designed and manufactured focusing on the safety objectives
- ▶ Manufacturers should draw up the technical documentation and carry out the conformity assessment procedure, and further prepare the EU declaration of conformity and affix the CE marking. Manufacturers should keep the technical documentation and the EU declaration of conformity for 10 years after placing the electrical equipment on the market
- ▶ These principles were incorporated into the Technical Regulation of Requirements on Ecodesign of Low-Voltage Electric Equipment (Resolution of CMU No. 1067 dated 16 December 2015)

Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) and 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment

- ▶ Define "electrical and electronic equipment" as the equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer, and measurement of such currents and fields and designed for use with a voltage rating not exceeding 1,000 volts for alternating current and 1,500 volts for direct current
- ▶ Prohibits the use of certain hazardous substances in electrical and electronic equipment (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, or polybrominated diphenyl ethers)
- ▶ The content of hazardous components in EEE is a major concern during the waste management phase, and recycling of WEEE is not undertaken to a sufficient extent. Lack of recycling results in the loss of valuable resources
- ▶ There are certain legislative initiatives to manage electronic waste in Ukraine that are being considered by the Parliamentary Committee (Draft Law on Wastes of Electrical and Electronic Equipment No. 2350 dated 30 October 2019 and Draft Law on Batteries and Accumulators No. 2352 dated 30 October 2019)

2.4.5. Legal framework

General and dedicated sectoral laws

Customs Code of Ukraine No. 4495-VI dated 13 March 2012

- ▶ The import duty is differentiated depending on goods originating from the countries, which together with Ukraine are the members of customs unions or form free trade zones
- ▶ Says that preferential rates of import apply to goods originating from Ukraine or member countries of the World Trade Organization or the countries with which Ukraine entered into bilateral or regional agreements on most favourable treatment, unless the law provides otherwise. Non-preferential (regular) rates of import duty applicable to the other goods
- ▶ Says that tariff preferences as to the rates of the customs tariff may take the form of relief from import duty, reduced rates of import duties, or tariff quotas in accordance with the laws of Ukraine and for the import of goods originating from the countries with the relevant international treaties

Law of Ukraine "On Customs Tariff" No. 674-IX dated 4 June 2020 sets out the regular and preferential rates of customs duties for goods imported to the custom territory of Ukraine under the Harmonized Commodity Description and Coding System

Law of Ukraine "On Ensuring of Large-Scale Expansion of Exports of Goods (Works, Services) of Ukrainian Origin by Insurance, Guaranteeing and Decreasing in Value of Export Credits" No. 1792-VIII dated 20 December 2016 provides the framework for the establishment of an export-credit agency (ECA) for:

- ▶ Protection of Ukrainian exporters from the risk of non-payment and financial losses associated with the implementation of foreign economic agreements (contracts) through insurance, reinsurance, and guarantees
- ▶ Development of export of goods (works, services) of Ukrainian origin, participation in the implementation of programs of partial compensation of interest rates on export credits, cooperation with international and foreign financial organizations
- ▶ The ECA was [established](#) as a private joint stock company, its constituent documents were approved. [The Resolution of the CMU No. 772 dated 21 August 2019](#) sets out the rules for the ECA's activities

Law on the List of Permit Documents in the Area of Business Activity No. 3392-VI dated 19 May 2011 has provisions for obtaining a conclusion on electromagnetic compatibility and permit for operation of a radioelectronic device

Law on Licensing of Certain Types of Business Activities No. 222-VIII dated 2

March 2015 mandates to obtain licenses for [development, manufacturing, and supply of special technical appliances](#) used for covert investigational activity ([criteria](#) and [list of technical means](#) are established by the CMU)

Law of Ukraine "On Labor Protection" No. 2694-XII dated 14 October 1992

- ▶ Provides that permit should be obtained to work with objects of increased danger and to use machines and equipment of increased danger if such equipment is not certified and declared to meet certification demands
- ▶ Says that workers of increased danger production plants should pass medical examination each year (employer takes on all the respective costs)
- ▶ Provides that the validity period of the permit for performance of works or operation of machines and equipment of increased danger is five years
- ▶ [List of Increased Danger Works approved by the State Committee of Ukraine on Supervision on Labour Protection No. 15 dated 26 January 2005](#) defines the exhaustive list of increased danger works, including works on electronics production (e.g., electric welding and soldering)

Law of Ukraine "On the General Safety of Non-Food Products" No. 2736-VI dated 2 December 2010

- ▶ Defines "safety non-food product" as any product, the usage of which has no risk or minimum risk in an ordinary situation or in the predictable situation, and such minimum risks are acceptable and have no threat to community interests
- ▶ Defines product characteristics, including its composition, package, mounting, and maintenance requirements
- ▶ Determines precaution requirements for the products, including those tailored to certain groups of customers (children, pregnant women, etc.)

Law of Ukraine "On Environmental Impact Assessment" No. 2059-VIII dated 23 May 2017 requires completion of the special environmental impact assessment procedures prior to engaging in the "planned activities" indicated in this law. The list of planned activities is quite broad and includes, among other things, manufacturing of vehicles and construction of plants. The analysis of whether the relevant activity qualifies as the planned activity and thus requires the environmental impact assessment may need to be carried out on a case by case basis

2.4.5. Legal framework

General and dedicated sectoral laws

Law of Ukraine "On State Market Supervision and Control of Non-Food Products" No. 2735-VI dated 2 December 2010

- ▶ Introduces a system of state market control and supervision over the conformity of non-food products supplied in Ukraine with national standards. Authorities that conduct supervision and market control provide consultancy support on market control regulation matters, the respective [procedure is approved by Resolution of the CMU No. 75 dated 12 February 2020](#)
- ▶ Provides for such supervision measures as an audit of characteristics of goods and restricting measures (suspension or ban on market disposal, recall of goods, notification to customers about the hazards of goods), establishes liability for non-compliance with market rules or supervision measures. The procedure for state control of non-food products is approved by the CMU's [Resolution No.1403 dated 26 December 2011](#)
- ▶ There are no special provisions for an audit of goods in online stores, which complicates the identification of the supply chain and enforcement of the supervision measures

Law of Ukraine "On Liability for Damages Caused by Defect in Products" No. 3390-VI dated 19 May 2011

- ▶ Has liability rules for damages caused to individuals and legal entities by defects in goods (finished products, raw materials, component parts), including those that form part of other movable or immovable property
- ▶ "Damages" are limited to injuries, damage to health, death, and damage to or destruction of property (other than the defective goods). Provides that the liability for damages caused by defective goods is imposed on the manufacturer, with certain exceptions established by the Law (an importer of defective movable goods bears liability as a manufacturer)

Law of Ukraine "On Technical Regulations and Conformity Assessment" No. 124-VIII dated 15 January 2015 sets out a foundation for adaptation of "vertical (sectoral) legislation" for ACAA implementation.

- ▶ Defines legal and organizational principles for developing, adopting, and applying technical regulations and conformity assessment procedures. Has rules for supervision of compliance with requirements referred to technical regulations, validity of foreign documents on conformity and conformity marks
- ▶ Provides that all goods placed on the market in Ukraine should comply with technical regulations. Has rules for certification of conformity of products, processes, services, systems, or personnel conducted by a third party

Law of Ukraine "On Metrology and Metrological Activity " No. 1314-VII dated 5 June 2014

- ▶ Provides that state regulation is carried out in relation to measurements, units of measurement, and measuring equipment for certain types of activities
- ▶ Sets general principles of measurement standards maintenance, verification, and calibration of measuring instruments, measurements, and calibration traceability assurance
- ▶ Regulates the status of the National Metrology Service and defines its structure. Establishes liability for violation of legislation on metrology and metrological activity

Law of Ukraine "On Standardization" No. 1315-VII dated 5 June 2014

- ▶ Sets out a legal and organizational framework for standardization in Ukraine and is intended to ensure a uniform technical policy in this area. The main goal of standardization is to ensure safety and eliminate barriers to trade
- ▶ The objects of standardization are: (i) materials, components, equipment, systems, their compatibility, (ii) rules, procedures, functions, methods, activities or their results, including products, personnel, management systems, (iii) requirements for terminology, marking, packaging, labelling, etc.
- ▶ [Standards](#) are divided into two groups: (i) national standards adopted by the authorized state enterprises and (ii) common practice standards and technical conditions

Law of Ukraine "On Consumer Rights Protection" No. 1023-XII dated 12 May 1991

- ▶ Governs the relationships between the consumers of goods (except for food products, if otherwise is not established by the Law), works and services, and the producers and sellers of goods, contractors, and service providers
- ▶ Prohibits unfair business practice, which includes actions qualified by law as a manifestation of unfair competition and any activity (action or omission) that misleads the consumer or is deemed an aggressive advertisement
- ▶ Set out the activities of state authorities in the area of consumer protection
- ▶ Establishes producer's liability for violation of legislation on consumer rights protection. In particular, the penalty for manufacturing products that do not meet the health or environmental safety requirements is fine in the amount of up to 300% of the goods value

2.4.5. Legal framework

General and dedicated sectoral laws

Law of Ukraine "On State Control over International Transfers of Military and Dual-Use Commodities" No. 549-IV dated 20 February 2003

- ▶ Defines the dual-use goods as products, equipment, materials, software, and technologies that are not specifically intended for military purposes but can be used for such purposes in addition to civil purposes or for the development and production of military good
- ▶ Certain electronics, vehicles, aircraft, and space objects are [listed](#) as dual-use goods. The export of dual-use goods require a permit from [the State Service of Export Control of Ukraine](#)
- ▶ The decision of the Council of National Security and Defense "On Improvement Measures of the State Military and Technical Policy" approved by Order of the President of Ukraine No. 691/2014 dated 27 August 2014 provides that export of goods of military or dual-purpose to Russian Federation is prohibited, except space technologies used for research and space use for peaceful purposes within the framework of international space projects

Law of Ukraine "On Transport" No. 232/94-BP dated 10 November 1994

provides that vehicles should meet the safety, labor protection, and environmental requirements and have an appropriate certificate

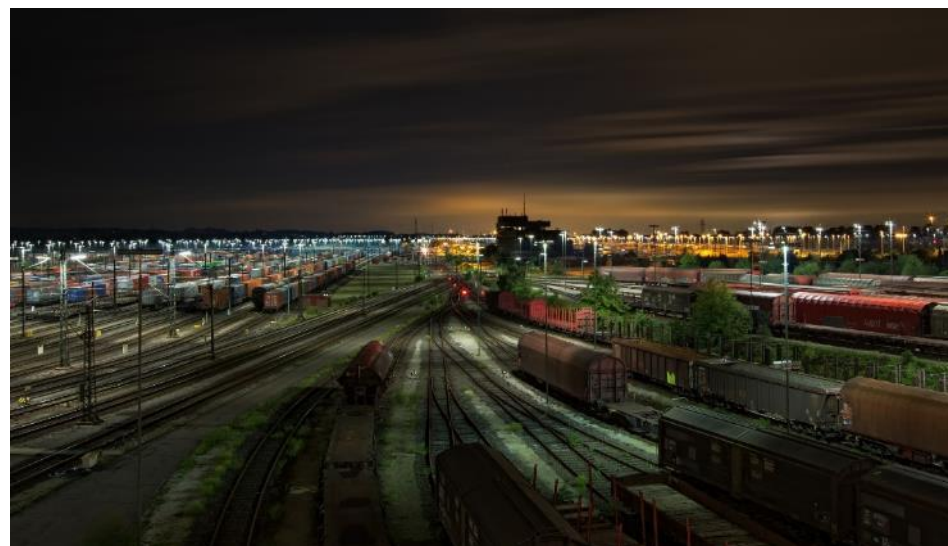
Law of Ukraine "On Road Transport" No. 2344-III dated 5 April 2001

- ▶ Provides for state regulation and control of road transport, development of road transport and investment policy, state registration of vehicles
- ▶ Has the certification rules for vehicles to conform compliance with safety requirements
- ▶ Has the classification of vehicles and obligatory requirements to their construction and technical characteristics — approved by Resolution of the CMU No. [1166](#) dated 22 December 2010

Air Code of Ukraine No. 3393-VI dated 19 May 2011 defines the aircraft and sets out the requirements for its safety, certification, and registration

Law of Ukraine "On Space Activity" No. 502/96-BP dated 15 November 1996

- ▶ Space activity includes research and development of space technologies. According to [the Law on Amendments to Certain Laws of Ukraine on the State Regulation of Space Activities](#), starting from 29 January, 2020 private companies can carry out the space activity (not only state operators)
- ▶ Provides that private companies seeking to conduct commercial space activities in and from Ukraine will have to submit a declaration to the [State Space Agency of Ukraine](#) (the procedure for submitting the declaration and its form are approved by [Resolution of the CMU No. 198 dated 26 February 2020](#))
- ▶ Says that certain commercial space activities (rocket engine testing, a satellite launch, and the control of satellites from Ukrainian territory) require a state permit (the application procedure for obtaining a permit is approved by [Resolution of the CMU No. 197 dated 26 February 2020](#))
- ▶ Says that objects of space activity produced in Ukraine and intended for operation on its territory are subject to mandatory certification



2.4.5. Legal framework

Sector-specific subsidiary regulations

Below we described key dedicated subsidiary regulations that set out the requirements for the manufacturing of electronics, automotive and machinery objects.

List of types of products that are subject to state market supervision, approved by Resolution of the CMU No. 1069 dated 28 December 2016

- ▶ Sets out the list of goods that are subject to state market supervision for conformity to established requirements (standards, technical requirements)
- ▶ Provides that vehicles, locomotives, and their parts that may be installed into/onto them are subject to state market supervision for conformity

Automotive and machinery

- ▶ **Procedure for approval of the design of vehicles, their parts and equipment and the Procedure for maintaining a register of certificates of type of vehicles and equipment and certificates of conformity of vehicles or equipment issued by manufacturers, approved by Order of the MIU No. 521 dated 17 August 2012 (Technical regulation on wheeled vehicles)** determines the mechanism for approval of the design of wheeled vehicles of certain categories, new parts, and equipment that can be installed and/or used on a wheeled vehicle. Each new or renovated vehicle or its series are subject to conformity certification and assessment for conformity to environmental rules
- ▶ **Technical Regulation on Agricultural and Forest Tractors, their Trailers and Replaceable Trailers, Systems, Components and Individual Technical Units, approved by Resolution of the CMU No. 1367 dated 28 December 2011** provides that tractors are subject to the type of vehicle certification and conformity assessment
- ▶ **Aviation Rules of Ukraine (Part 21), approved by Order of the State Aviation Administration of Ukraine No. 529 dated 26 April 2019** provides for certification of aircraft and its components, as well as enterprises and organizations that develop and manufacture aircraft and components (e.g., certificates of environmental compliance)
- ▶ **Aviation Rules of Ukraine (Part 47), approved by Order of the State Aviation Administration of Ukraine No. 153 dated 5 February 2019**
 - ▶ Define plane as an aircraft that is heavier than air and is driven by a power plant, the lift of which in flight is created mainly by the aerodynamic impact on

surfaces that remain stationary in such flight conditions

- ▶ Says that each aircraft registered in the State Register of Civil Aviation of Ukraine should bear the state and registration marks affixed to the aircraft by the State Aviation Administration of Ukraine
- ▶ **Technical Resolution of Recreational Watercrafts, approved by Regulation of the CMU No. 1147 dated 09 October 2011** provides that recreational watercrafts are subject to watercraft type certification and conformity assessment
- ▶ **Technical Regulation of Marine Equipment, approved by Resolution of the CMU No. 1103 dated 5 September 2007** provides that:
 - ▶ Manufacturer or its authorized representative draws up a declaration of conformity
 - ▶ Marine equipment is subject to conformity assessment conducted by the manufacturer or its authorized representative
- ▶ **Rules on Technical Exploitation of Railways of Ukraine, approved by Order of the Ministry of Transport No. 411 dated 20 December 1996** govern the procedure of operation of railways and employees of railway transport, have provisions for maintenance of constructions and train traffic management system

Electronics

- ▶ **Technical Regulation for Restriction of Use of Certain Hazardous Substances in Electrical and Electronic Equipment, approved by Resolution of the CMU No. 139 dated 10 March 2017** prohibits using certain hazardous substances in electrical and electronic equipment
- ▶ **List of National Standards That Are Identical to Harmonized EU Standards and Compliance with which Provides the Presumption of Conformity of Equipment to the Requirements of the Technical Regulation of Low-Voltage Electrical Equipment, approved by Order of the Mineconomy No. 309 dated 22 February 2019** provides that low-voltage electrical equipment which complies with EU standards is presumed to meet national standards and does not require additional standardization

2.4.5. Legal framework

Strategic documents and legislative initiatives

Export Strategy of Ukraine ("Road Map" of Strategic Trade Development) for 2017-2021 and Plan of Tasks and Measures for the Implementation of Export Strategy of Ukraine, approved by Regulation of the CMU No. 1017-p dated 27 December 2017

- ▶ Outlines the main objects for export, such as turbojet engines, pumps, transmission shafts, bearings, engines and power plants, rolling mills, boilers, turbines, electric machines, and equipment
- ▶ States that heavy machinery as a sector of the economy is declining and requires investments and innovations
- ▶ Mineconomy is currently working on the feasibility assessment of the new free trade agreements with the Cooperation Council for the Arab States of the Gulf and the Republic of Indonesia
- ▶ The Export Promotion Office (EPO) was established by Order of the Mineconomy No. 864 dated 23 June 2018 for implementation of the Export Strategy and promotion of export of goods and services of Ukrainian producers. The EPO was launched in 2018
- ▶ In 2019, the EPO joined the [European Trade Promotion Organizations Working Group of Information Professionals](#) (promotes the exchange of information on best practices and experiences on information and consulting services) and became an official member of the Enterprise Europe Network-Ukraine consortium (aims to find buyers and sellers in international markets for small and medium-sized companies, as well as investors and partners for production cooperation)

Strategy for Development of the Defence Industry of Ukraine for the Period until 2028, approved by Regulation of the CMU No. 442-p dated 20 June 2018 provides for such objectives as:

- ▶ Establishment of the joint ventures and/or PPP schemes with the cross-border investment to expand the production capacity of the defence industry
- ▶ Growth of foreign investment in the defence industry
- ▶ Removal of restrictions on the incorporation of joint ventures, the attraction of foreign investment in Ukrainian companies of the defence industry as well as their improvement through PPP models
- ▶ Search of the potential partners and investors among the largest global consumers of the shipbuilding industry

Draft strategic and policy documents

Draft Export Strategy for the Machinery Sector (study) (published for the public discussion at the Mineconomy's official website in October 2019) provides for:

- ▶ Implementation of incentives at the state, regional and local levels to support priority export machinery subsectors for export (interest-free loans, targeted financing, and compensation of costs for international certification)
- ▶ Development of a list of benefits and preferences for the investors in priority machinery subsectors (VAT exemption for import of technological equipment and equipment from R&D activity, exemption from land tax, etc.)
- ▶ Development of a plan to gradually reduce customs duties on imported goods for the machinery sector
- ▶ Adoption of a voluntary environmental standard for the machinery sector with the purpose of maximizing recycling and reuse and minimizing waste
- ▶ Development of a legal framework for the management of waste and adoption of stricter environmental standards



2.4.5. Legal framework

Legislative initiatives

Implementation of ACAA

Draft Law of Ukraine "On Amendments to the Law of Ukraine "On the Technical Regulations and Conformity Assessment" regarding recognition of the EU conformity assessment by Ukraine" No. 3904 dated 17 July 2020 (is being considered by the Parliament)

- ▶ EU certificates of conformity of the industrial products are recognized by Ukraine unilaterally. Such measure will allow the importers, once their products are confirmed by the EU, to avoid a second conformity assessment in Ukraine and save costs
- ▶ At the same time, the Parliamentary Committee on EU Integration observed that the Draft Law provided only for unilateral acceptance of the EU certificates by Ukraine, while Article 57 of the Association Agreement said that the mutual recognition should be implemented by entering into ACAA. Consequently, the Committee found that the Draft Law did not meet the international obligations of Ukraine stipulated in the Association Agreement

Alternative Draft Law of Ukraine "On Amendments to the Law of Ukraine "On Technical Regulations and Conformity Assessment" regarding the Issue of the mutual recognition of the conformity assessment and acceptability of industrial goods with the European Union" No. 3904-1 dated 4 August 2020 (is being considered by the Parliament)

- ▶ Mutual recognition of the conformity assessment of the industrial goods between Ukraine and the EU will be implemented as provided by the ACAA
- ▶ Provides for the adoption of the harmonized EU standards in the Ukrainian language
- ▶ Information on the label of goods will be presented in the language of the country where such goods are imported
- ▶ The Parliamentary Committee rejected the proposed draft law again, referring to the ACAA as the only instrument that should deal with this subject matter

Draft Law of Ukraine "On Amendments to the Customs Code of Ukraine in Connection with the Adoption of the Law of Ukraine "On Standardization" No. 2477 dated 21 November 2019 (was adopted in the first reading on 3 December 2020 and is being prepared for the second reading in the Parliament)

- ▶ Provides for the principle of voluntary application of international, national, and industry standards, as well as standards and specifications adopted by companies, institutions, and organizations
- ▶ The Parliamentary Committee on EU Integration found that the provisions of the draft law were in line with Ukraine's international obligations

Industrial parks

Draft Law of Ukraine "On Amendments to the Law of Ukraine On Industrial Parks to Attract Investment in the Industrial Sector of the Economy by Introducing Incentives for the Industrial Parks" No. 4416-1 dated 10 December 2020 (is being considered by the Parliament) provides for the following types of state support for industrial parks:

- ▶ Partial compensation of interest payments on loans to participants of industrial parks to encourage export of value added goods. The state support amount depends on the share of export of own production in the total revenue – larger coverage for larger export (up to 70% of the total amount of interest payments to the producers that are exporting more than 70% of their goods)
- ▶ Compensation of interest payments on loans used for the arrangement of industrial parks to management companies and participants of industrial parks to encourage infrastructure development
- ▶ Partial compensation of investments to participants of industrial parks that were invested to the establishment of manufacturing by the funds of the State Budget. The compensation amount depends on the share of export of own production within 3 years (up to 70% of total capital expenditures for more than 70% of export)
- ▶ Specific rules for procedures will be established by the CMU
- ▶ This draft law will be evaluated from the perspective of Ukraine's obligations under the WTO agreements

Electronics

Draft Law of Ukraine "On Waste Electrical and Electronic Equipment (WEEE) No. 2350 dated 30 October 2019" and **Draft Law of Ukraine "On Batteries and Accumulators" No. 2352 dated 30 October 2019** (are being considered by the Parliament) introduce the EU principle "polluter pays" into the Ukrainian law by setting out the extended responsibility system applicable to producers and importers of certain types of electronics (including batteries):

- ▶ They should be registered, report to the authorities, and meet recycling targets
- ▶ Producers of wasteful electrical and electronic equipment should ensure proper disposal, recycling, and treatment of WEEE
- ▶ Producers of portable batteries and accumulators should ensure that a used product can be accepted from the customers for recycling and is duly labelled
- ▶ Fines are introduced for the improper introduction on the market and labelling of WEEE
- ▶ The Parliamentary Committee on EU Integration reported that the provisions of both Draft Laws were in line with Ukraine's international obligations

2.4.5. Legal framework

Legislative initiatives

Machinery

Draft Law of Ukraine "On Amendments to the Tax Code of Ukraine and Certain Laws of Ukraine on Stimulating Development of the Electric Transport Sector in Ukraine" No. 3476 dated 14 May 2020 (was adopted in the first reading on 2 September 2020 and is being prepared for the second reading in the Parliament)

- ▶ The taxpayer will be entitled to deduct from taxes the costs of an electric car (or cars) until 31 December 2030
- ▶ Profit of companies from the sale of electric motors, lithium-ion (lithium-polymer) batteries, chargers for vehicles, and vehicles with electric motors will be exempted from tax until 2033
- ▶ Goods for the production of vehicles with electric motors will be exempted from VAT and customs duties until 2029

Draft Law of Ukraine "On Amendments to the Customs Code of Ukraine to Stimulate Development of the Electric Transport Sector in Ukraine" No. 3477 dated 14 May 2020 (was adopted in the first reading on 2 September 2020 and is being prepared for the second reading in the Parliament) provides for exemption from customs duties of the components and equipment for the production of vehicles with electric motors imported in Ukraine until 1 January 2029

Draft Law of Ukraine "On Amendments to the Law of Ukraine "On Stimulating Development of Domestic Mechanical Engineering for the Agro-Industrial Complex" to Stimulate Jobs in the Industry" No. 3804 dated 7 July 2020 (is being considered by the Parliament) increases the support for agricultural entities from 25% to 30% for compensation of machinery purchases (for farms - up to 40%)

Import and export

Draft Law of Ukraine "On Protection Against Dumped Import" No. 4132 and Draft Law of Ukraine "on Protection Against Subsidized Imports" No. 4133 dated 21 September 2020 (are being considered by the Parliament)

- ▶ Define dumping as an import into the customs territory of goods at prices lower than the comparable price of similar goods in the country, which causes harm to the domestic industry
- ▶ Subsidized import - import into the customs territory of the country of goods benefiting from the subsidies provided by another country for the production, processing, transportation, or export of such goods

- ▶ The draft laws aim to improve the mechanism for conducting the anti-dumping/anti-subsidy investigations, as well as the mechanism for applying the anti-dumping/anti-subsidy measures based on such investigations
- ▶ Provide for the mechanism for collection of the anti-dumping/compensatory fines
- ▶ Provide for implementation of the principle of transparency of the anti-dumping/anti-subsidy investigation and its predictability for all stakeholders

Draft Law of Ukraine "On Amendments to the Law of Ukraine on Ensuring a Large-Scale Expansion of Export of Goods (Works, Services) of Ukrainian Origin through Insurance, Guarantee and Cheaper Export Lending to Provide for Effective Functioning of Export Credit Agency" No. 3793 dated 3 July 2020 (is being considered by the Parliament)

- ▶ Expands the Export Credit Agency's (ECA's) ability to insure and reinsure export factoring
- ▶ Provides for the increase of the ECA's initial share capital to at least UAH 2 bln from the state budget
- ▶ Clarifies that the investments can be insured only against non-commercial risks, based on global practices
- ▶ Sets out the exhaustive list of processing goods supported by the ECA
- ▶ Provides for the state guarantees as the only type of state aid to ensure fulfillment of ECA's debt obligations (abolishes loans from the state budget)

Draft Law of Ukraine "On Amendments to Certain Laws of Ukraine on High-Risk Objects" No. 4407 dated 19 November 2020 (is being considered by the Parliament)

- ▶ Sets out the procedure for assigning objects to the high-risk category (identification)
- ▶ Allocates functions on ensuring safety and protection of the population outside the high-risk objects to the local municipal authorities
- ▶ Provides for the obligation of a business entity to suspend the production in case of an accident involving a high-risk object
- ▶ Abolishes the application of a safety declaration by replacing it with a report on safety measures
- ▶ The Parliamentary Committee on EU Integration found that the Draft Law is in line with Ukraine's international obligations under Association Agreement between the European Union and Ukraine and Directive 2012/18/EC, but need refinement to be aligned with certain provisions (e.g., criteria for assigning high-risk category and the possibility of transfer to another high-risk category)

2.4.6. Conclusions





2.4.6. Conclusions

Labor market

Labor cost and demand

Average monthly salary in Advanced Manufacturing subsectors as of September 2020 was the lowest among other industrial subsectors¹: USD 443 gross for Automotive subsector, USD 475 gross for Electronics subsector (no data were available for Heavy Machinery subsector in 2020, yet in 2019 it was the lowest paid among other industrial subsectors). Overall, such salary levels are slightly higher than the general market average in Ukraine.

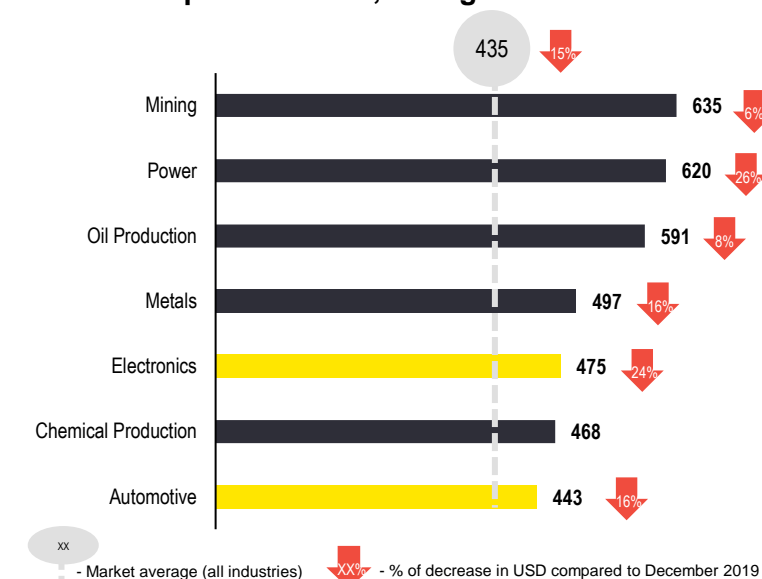
The Advanced Manufacturing sector has been significantly impacted by the COVID-19 crisis. The number of unemployed within the sector has increased by 68% as of the 1st November 2020 (compared with the 1st November 2019)¹. Moreover, the number of vacancies within the sector has also decreased by 30% compared with the 1st of November 2019¹, which may result from decreasing industrial production since 2019.

Advanced Manufacturing companies struggle to attract and retain qualified technical specialists (manual workers)² due to a number of reasons. In particular, young candidates do not consider this industry as attractive and also lack practical skills, experienced candidates are prone to relocating abroad mainly due to higher salary levels. Automotive companies experience difficulties with the following jobs³: design engineers, quality assurance specialists, manual operators, automation engineers; Electronics companies – with mechanical, testing, and programming engineers.

On the other hand, Ukraine has been a well-known regional hub for education, research, and manufacturing in the area of Advanced Manufacturing. Such legacy focus on the development of the industrial economy left Ukraine with a significant pool of talent with strong technical expertise, including among the higher education sector. Current challenges that Ukraine needs to address are related to succession planning and knowledge transfer, as well as prioritizing investment in the development of infrastructure and research and development.

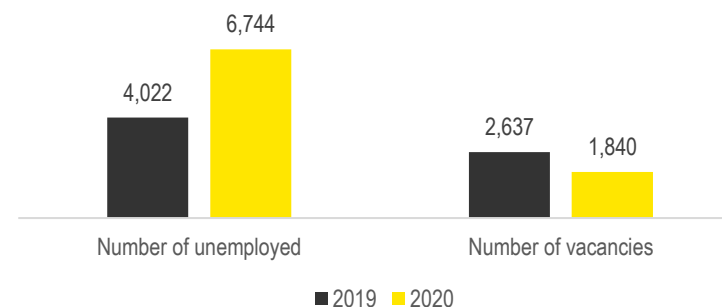
There were quite a few successful cases in recent years, which demonstrate the potential of the Ukrainian market to serve as a hub for Advanced Manufacturing. Companies that have opened/plan to open their production facilities in Ukraine include Jabil Circuit, Ajax Systems, Kostal.

Average monthly salaries among industrial subsectors as of the 1st September 2020, USD gross



Source: The State Statistics Service of Ukraine; National Bank of Ukraine

Number of unemployed and number of vacancies in Advanced Manufacturing sector



Source: The State Statistics Service of Ukraine



2.4.6. Conclusions

Labor market

Higher education and PhD

The share of students who graduated from and enrolled in Advanced Manufacturing fields of study last academic year is almost the same (12.8% vs 12.1%)¹, which means that the attractiveness of these fields of study remains on the same level. Such fields of study are largely supported by state-funded scholarships to attract more students (64% of enrollees in 2019 were paid for by the state budget, only 36% - paid education). In comparison, 67% of students enrolled for paid education in Governance and Administration (the most popular in 2019).

In terms of PhD students, the percentage of those who graduated in 2019 in the relevant fields of study (out of total students who obtained PhD) constitutes only 8%, which is lower than the number of graduates with Master's/Bachelor's level for the same specializations (among all graduates). In comparison, the share of PhD graduates for Social and Behavioral studies is 17%.

Overall low attractiveness of these fields of study and further employment is caused by comparatively low salary levels, harsh working conditions, and outdated infrastructure.

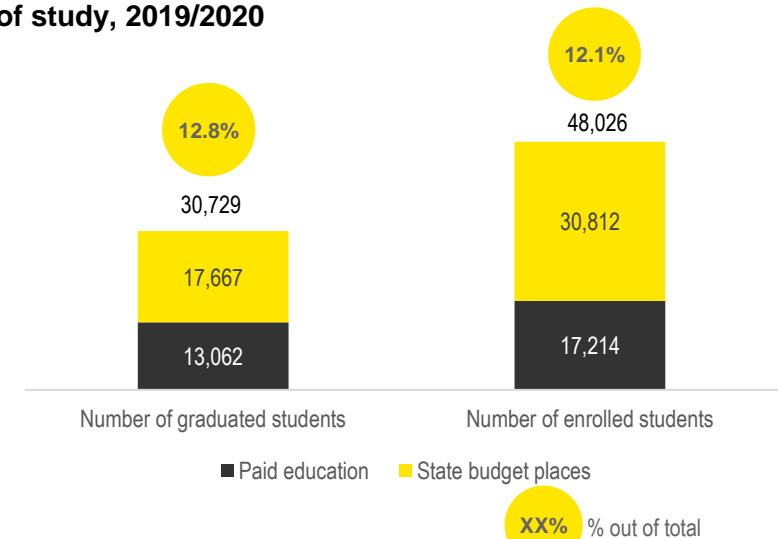
The majority of employers mention a good theoretical knowledge base of graduates, however, they are not satisfied with the quality of practical skills. They mention a gap between learning programs and business needs, as well as the outdated infrastructure used to get practical experience. As a result, companies have to invest in internship programs and additional training to upskill graduates. Employers strive for closer cooperation with universities to shape learning curricula with a focus on practical skills. They are also ready to help them develop capability among faculty staff and share knowledge. Such cooperation has to be supported by the government to ensure required financing and other support.

Migration

Labor migration abroad is one of the key challenges for Advanced Manufacturing – indeed, 66% of Automotive companies mentioned it in one of the recent EY surveys (compared with 42% for the general market)². The main reason for such a trend is the difference in salary levels as compared to neighboring countries, in particular EU member countries. The category most at risk is manual workers (e.g., welders, electricians, engineers). The majority of labor migrants (48%) are leaving the country for short-term. Their key motivation to go abroad is to make savings for life in Ukraine. Covid had reduced the labor migration trends in H1 2020, however as the situation evolves, we see an increasing demand for Ukrainian workers abroad, which is expected to grow.

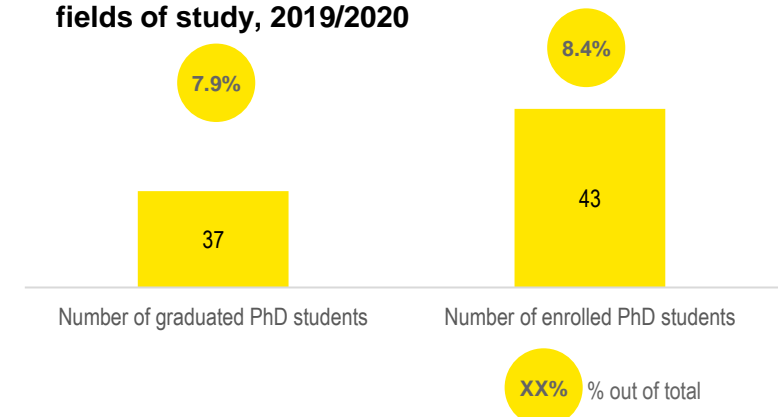
In order to retain workers in Ukraine, employers have to become more competitive in terms of remuneration as well as offering benefits related to employees' wellbeing, such as loan programs, housing, medical insurance, corporate pension programs, etc. Also, government and businesses may cooperate to improve local infrastructure and provide relevant social programs.

Number of persons, who obtained an educational degree and admitted to study in Advanced Manufacturing fields of study, 2019/2020



Sources: The State Statistics Service of Ukraine

Number of PhD students, who obtained the degree and admitted to study in Advanced Manufacturing fields of study, 2019/2020



Sources: The State Statistics Service of Ukraine



2.4.6. Conclusions

Considering described analysis we identified the following key factors influencing the potential attractiveness of the sector for investors



Wide variety of developed and cheap production sites

Ukraine has a sizeable amount of production facilities, inherited after the collapse of the USSR that retained capital assets and labor force, making it easy to scale existing production with minor CapEx.



Government attention to FDI and newly proposed incentives

Ukrainian government adheres to the path of reforms aimed at FDI attraction, and the adoption of so-called 'investment nanny law' should further promote Ukraine as a winsome direction for investments.



Proximity to the European countries and FTA with the EU

The proximity to the EU borders, together with the signed FTA brings opportunities for both existing and potential Ukrainian production facilities by unlocking for them the growing European market.



Growing internal consumption and low penetration rates

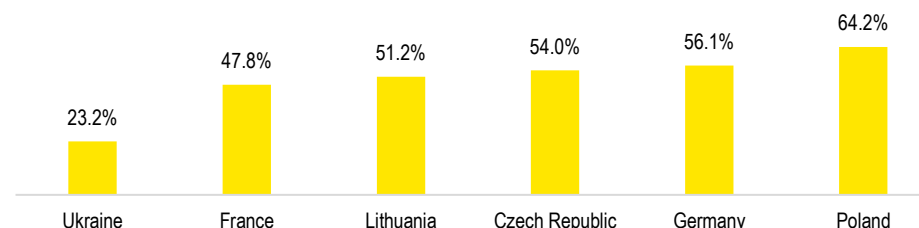
The comparatively high and fast-growing local demand for goods in the analyzed sectors points to (i) localization opportunities; (ii) the ability to provide reliable market sales for new potential market players.



Skilled labor force with unique professional experience

Ukraine has several technical universities and colleges that graduate qualified engineers, who, along with experienced post-Soviet professionals, can serve sophisticated productions.

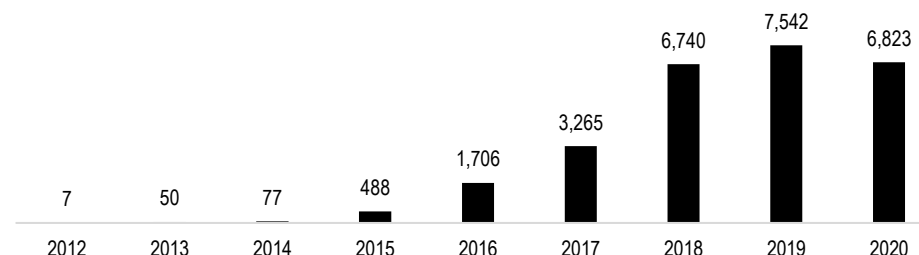
Penetration of cars, Ukraine vs selected European countries, %



Sources: Statista, EY analysis

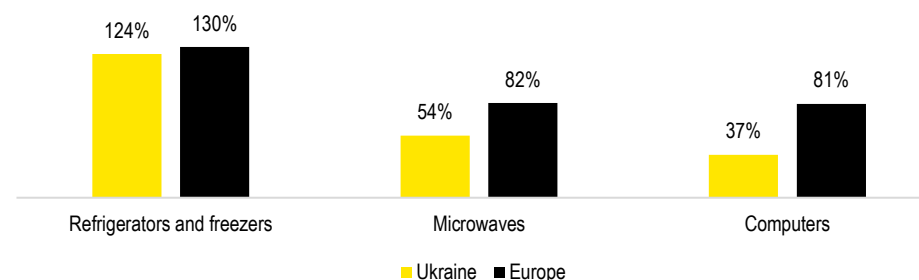
Note: For Ukraine and Poland data is presented by the end of 2019; for Lithuania and Czech Republic – by the end of 2018; for Germany and France - by the end of 2017.

Dynamics of registered electric vehicles in Ukraine, 2012-2020



Sources: Ministry of Infrastructure, Ukravtoprom

Penetration of household appliances, Ukraine vs Europe, 2018, %



Sources: SSSU, Statista, eceee



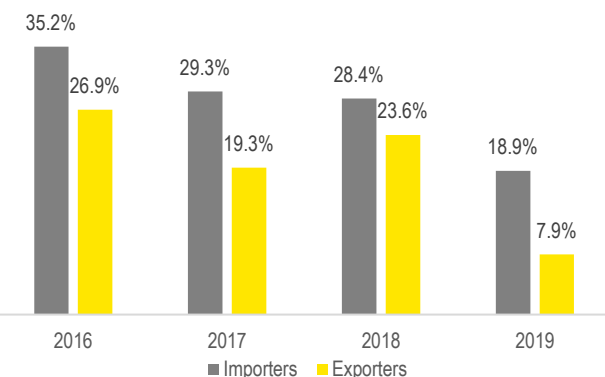
2.4.6. Conclusions

Gaps and barriers (1/3)

Customs delays

Customs procedures might be lengthy and cumbersome. This is especially damaging for companies in advanced manufacturing, trying to integrate into highly dynamic global value chains. The days of delay in customs may ruin the company's relationships with its clients and lead to its exclusion from the reliable suppliers' lists. Customs reform will lead to ease of doing business (19% of companies reported problems with imports in 2020; 8% with exports). Among the major barriers are an opacity in determining the customs value of goods (39% of companies reported this), the complexity of customs tax legislation (32%), and high rates of customs duties (28%). Exporting firms see complicated rules of product origin (20%), long export processing on customs (20%), and uncertainty of Ukraine's trade policy (16%) as the major barriers.

Exporters/importers facing customs obstacles, %



Inefficient local customs control

Lack of effective and transparent customs control instruments affects the competition in local markets and consequently discourages investments in the manufacturing of goods for local customers.

According to the market sounding reports, the share of [illegally imported](#) (20 % by the contraband and 40 % by an incorrect declaration of goods and customs value) electronics ranges from [20](#) to [30](#) percent of the total volume of market sales. The core problem areas of illegal import are lack of transparency in customs procedures and [corruption risks](#)

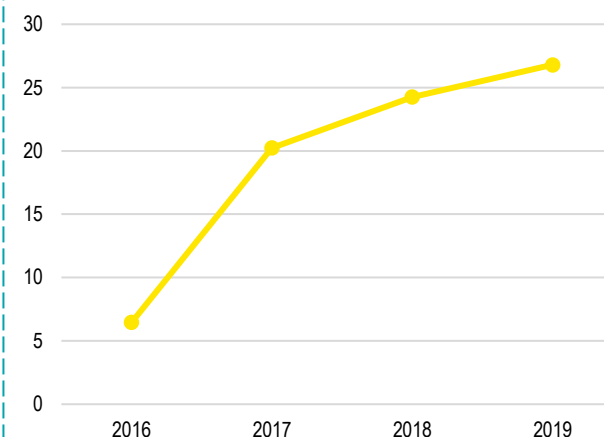
The above issues can be potentially addressed by:

- ▶ Digitalization of the main customs clearance procedures
- ▶ Full-fledged launch of the [national electronic transit system](#) (currently at the [pilot stage](#))
- ▶ [Implementation](#) of provisions of the Convention on a Common Transit Procedure in Ukrainian legislation and Ukraine's accession to the new computerized transit system (NCTS) to ensure the formation of secure supply chains, significantly simplify customs formalities for highly reputable companies and increase business efficiency

Lack of blue collar labor force

Despite the generally strong standing of Ukraine among peers in terms of cheap and skilled labor availability, some companies might experience a lack of blue-collar labor force for advanced manufacturing. The problem lies not only in migration (esp. for western areas) of workers but also in the poor vocational education system. Large companies are already creating their own educational facilities; PPPs with Ukrainian education institutions may be considered.

Ukraine emigrants, thousands 2014-2019



Source: SSSU

Note: Excluding the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the temporarily occupied territories in Donetsk and Luhansk regions.



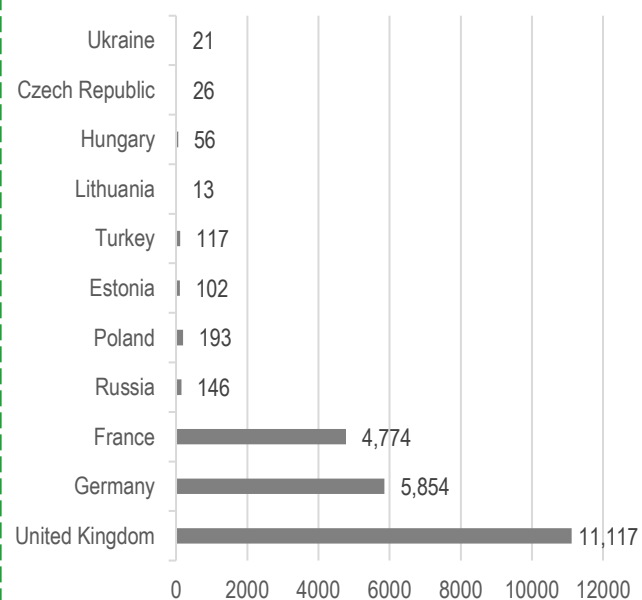
2.4.6. Conclusions

Gaps and barriers (2/3)

Access to capital

Access to global venture funding market and easy cross-border payment procedures are important for the export-oriented tech industry, especially for young and growing companies willing to take advantage of the global tech trends. The regulations on capital controls, equity placements abroad, financial monitoring legislation must be amended to make it easier for the companies to comply, balancing the existing risk-oriented approach with business and growth-oriented.

Capital invested in tech in 2019, USD m



<https://2019.stateofeuropeantech.com>

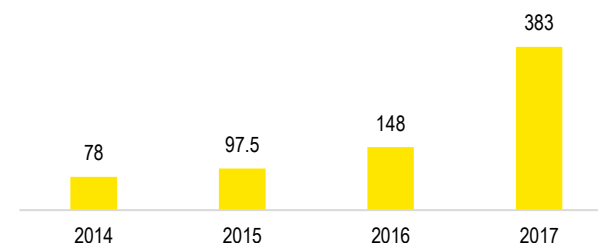
Import and usage of aged and damaged cars

The Ukrainian market is one of the most promising markets in Europe. The passenger car park exceeded 8.5 million in 2020, but the automotive remains at a low level (232 cars per 1000 residents, as of January 1, 2020), the average age of the vehicles is 22.4 years (as of January 1, 2020).

However, the latest reduction of import duties, as well as the absence of regulatory barriers, led to a significant filling of the market with used cars imported from the USA and Europe. At first, it helped to reduce the usage of old Soviet transport (average age of vehicle decreased), while now it makes Ukraine a junkyard near the EU.

On the opposite, economic stimulation of car renewal (e.g., through loan programs, discounts on new cars purchase), as well as additional barriers for import and usage of aged cars, may lead to additional advantages for locating car production in Ukraine.

Dynamic of cars with EU registration, ths

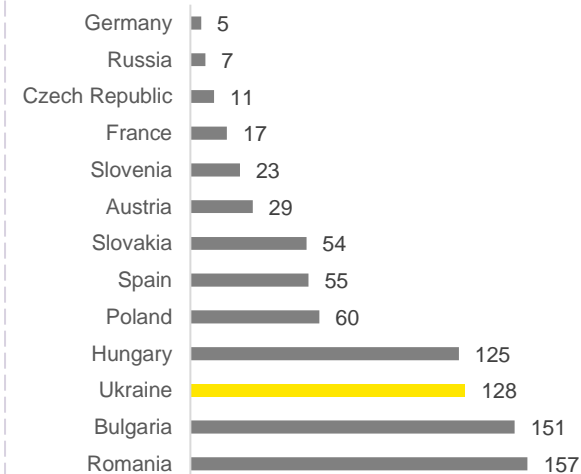


Source: State Fiscal Service

Issues with connections to power networks

As was mentioned previously, according to the Doing Business methodology, Ukraine possesses a very complicated and inefficient grid connection process at the level of distribution system operators. There were some positive changes, like implementing a geographic information system or introducing an outage compensation mechanism. However, the country's score for getting electricity sub-index remains 62.5/100 points (the average time for connection is 267 days). It is far below adjacent European markets (see the graph below). Fast and cheap connection to the grid should be assured to make the industry more attractive for potential foreign investors.

Getting electricity rank,



Source: Doing Business, World Bank



2.4.6. Conclusions

Gaps and barriers (3/3)

Lack of mutual recognition of certification

Goods made in Ukraine are subject to conformity assessment against the EU standards. This creates additional trade barriers for export to the EU

- ▶ To reach mutual recognition of conformity assessment, Ukraine and EU confirmed their commitment to conducting the preliminary analysis of approximation of Ukrainian legislation to EU standards to establish an 'industrial visa-free regime' in three priority sectors:
 - ▶ Low voltage equipment
 - ▶ Electromagnetic equipment
 - ▶ Machines and mechanisms
- ▶ Ukrainian technical regulations should be properly aligned with the EU law. The technical regulations relating to the above priority sectors were recently updated for the purposes of executing the ACAA (the execution of ACAA is expected in early 2021)
- ▶ The Draft Law No. 2477 dated 21 November 2019 (adopted in the first reading on 3 December 2020 and waiting for the second reading) introducing the principle of voluntary application of international, national, and industry standards needs to be adopted to improve the situation in conformity assessment

Inefficient capacity of ECA

Lack of an effective state institution capable of guaranteeing the rights of Ukrainian exporters discourages investments in the manufacturing of goods for export

- ▶ The Export Credit Agency (ECA) was established in 2018. It should protect Ukrainian exporters of value added goods from non-payment risks and financial losses, as well as provide affordable financing via such instruments as insurance, reinsurance, and guarantees. The ECA aims to provide insurance services for Ukrainian exporters operating at the complicated markets (such as Africa, Asia, Central and South America that make 40% of the export market for Ukraine). Such services are not provided by the private insurance companies
- ▶ The ECA has not begun performing its functions of protecting Ukrainian exporters. Certain regulations for the ECA's services have not been approved yet. ECA's supervisory board has not been appointed yet either
- ▶ Draft Law No. 3793 dated 3 July 2020 (was adopted in the first reading on 3 February 2021) aims to expand the ECA's authority, increase its chartered capital and align certain provisions of the dedicated law on export support with other laws
- ▶ The ECA's capacities need to be develop, and this should be made fully operational to encourage export of local manufacturers and attract investments

Inefficient environmental requirements

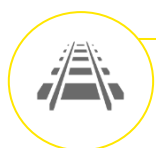
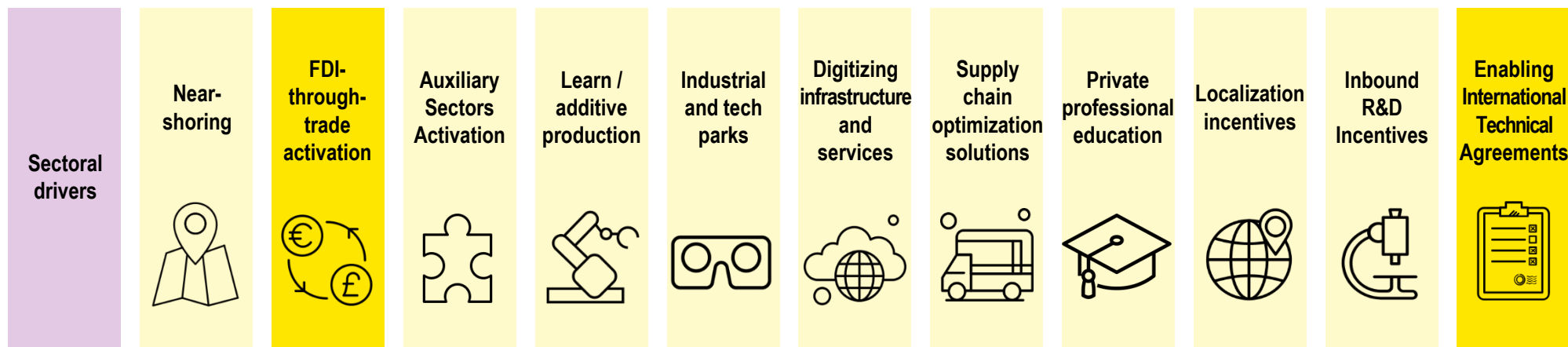
The environmental requirements for used and salvage title vehicles and second-hand equipment imported into Ukraine are quite inconsistent. This distorts competition with the manufacturers of the new equivalent products in the local market and raises grave environmental concerns

- ▶ On average, the sale of four imported second hand passenger cars in Ukraine tentatively correlates with the sale of one new car (whether imported or domestically manufactured)
- ▶ The legal background of this issue stems from the Environmental and Social (E&S) standards applicable to imported used vehicles and brand new cars
- ▶ Used vehicles must be in compliance with certain environmental requirements (EURO-2) to be imported into Ukraine and registered for use. The new cars for these purposes should, however, comply with EURO-5 standard. The application of EURO-6 standards commonly used in the EU was postponed until January 2025. Differences in application of standards create the price gaps, distort competition and raise E&S risks
- ▶ In addition, there is no separate procedure for conformity examination of the renewed cars produced from different scrapped vehicles that are imported into Ukraine as spare parts. This means that such cars can be legalized in Ukraine as newly manufactured vehicles
- ▶ In order to uphold fair market competition and mitigate hazards, the dedicated legislation on E&S requirements for vehicles should be aligned with current EU standards and apply with reasonable equality to all vehicles that are placed on the market in Ukraine



2.4.6. Conclusions

Moreover, through predefined measures it is possible to activate FDI for Advanced Manufacturing and auxiliary sectors in the long-term (1/4)



Creation of new free-trade zones

Elimination of customs tariffs and non-tariff barriers should increase the volume of international trade and encourage traders to invest in new production facilities.



Increase in freight quotas

Increase in the permitted volume of trade within existing trade agreements to encourage foreign partners to open new or expand existing production facilities in Ukraine



'Visa-free' regime for industrial goods with the EU (ACAA)

Opening the access for industrial products to the EU markets based on recognition of Ukrainian products conformity assessments is expected to create a more FDI friendly environment



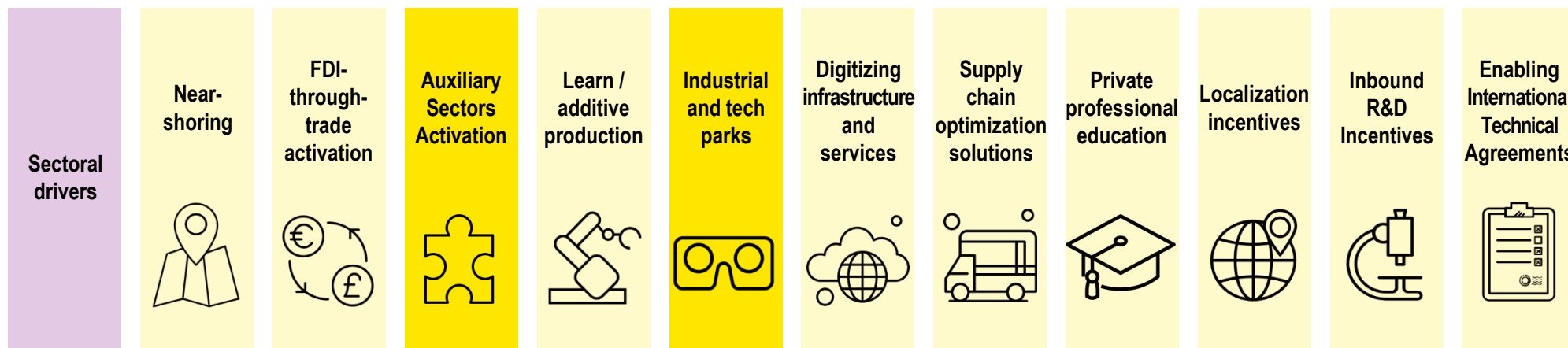
Cross-border reporting on productions' hazard to RAPEX

Rapid Alert System for dangerous non-food products is a safety gate for customers, market supervision, and control authorities that allows taking efficient measures to prevent damage caused by defective goods

Mechanisms to achieve described FDI activators: 1) Industrial parks development, 2) Greenfield construction projects for new facilities, 3) Brownfield development of existing production facilities

2.4.6. Conclusions

Moreover, through predefined measures it is possible to activate FDI for Advanced Manufacturing and auxiliary sectors in the long-term (2/4)



Supplementary materials

Being a high value-added production, Advanced Manufacturing productions should increase utilization of existing semi-products subsectors (e.g., steel, glass, semiconductors)



Energy and raw materials

Advanced Manufacturing facilities located in Ukraine will search for closer sources of energy (e.g., power, fuel) and raw materials (e.g., silicium, lithium) for production.



Attraction of Anchor producers to industrial parks

Complex anchor productions in industrial parks may multiply a positive effect through the attraction of smaller supplementary facilities and, as a result, the creation of a production cluster.



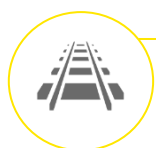
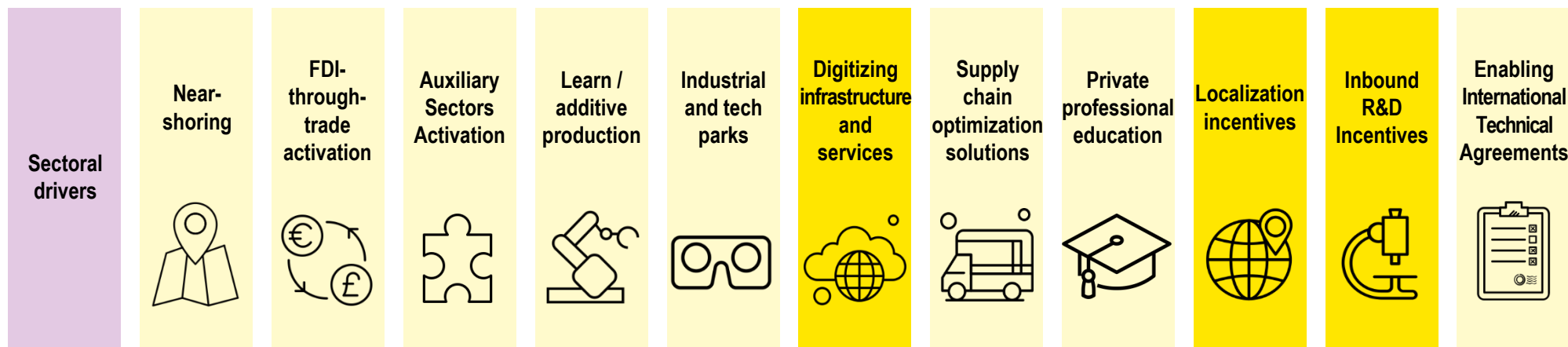
Available connections to utility networks in industrial parks

With existing issues on new power connections, industrial parks with required infrastructure connections allow to avoid the unnecessary issues for potential investors and fasten investment projects

Mechanisms to achieve described FDI activators: 1) Industrial parks development, 2) Development of existing facilities, 3) Greenfield construction projects for new facilities

2.4.6. Conclusions

Moreover, through predefined measures it is possible to activate FDI for Advanced Manufacturing and auxiliary sectors in the long-term (3/4)



Industry 4.0

Automatized and data-driven production processes will create more price-competitive, high quality products and improve capacity utilization.



Research & Development (R&D) in the aerospace industry

The development of R&D activity, especially in the aerospace industry, can lead to the full-cycle production of relevant advanced manufacturing products.



Growing population and local demand

Large population of Ukraine and low penetration of consumer products (e.g., amount of household appliance, TV sets per citizen is low vs. EU) ensure strong local demand in a long-term.



Demand on construction, agriculture, and transport machinery

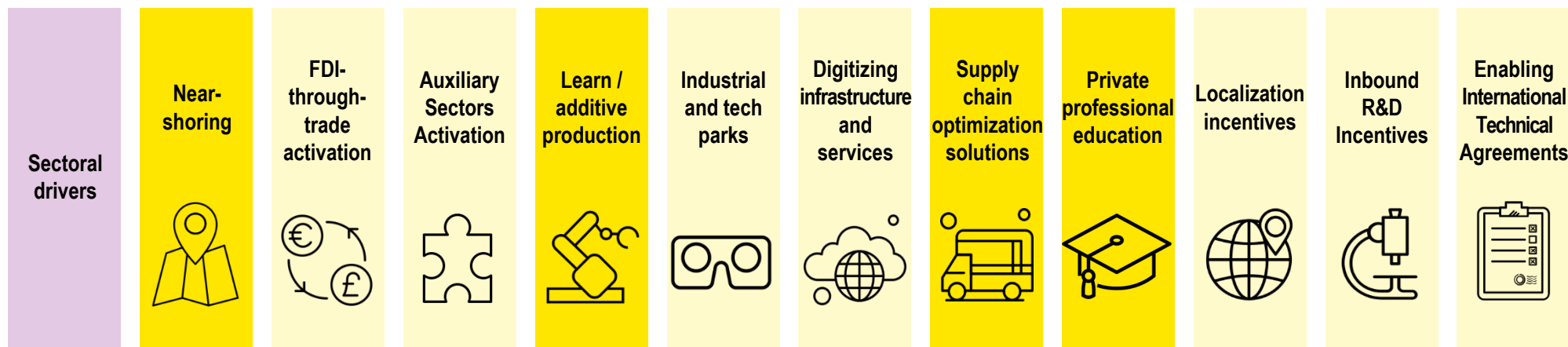
Fast-growing construction and agri sectors, as well as replacement of transport fleet, motivate localization of machinery or its parts production In Ukraine with further export potential.

Mechanisms to achieve described FDI activators: 1) Industrial parks development, 2) JVs or agreements on localization, 3) Greenfield construction projects for new facilities



2.4.6. Conclusions

Moreover, through predefined measures it is possible to activate FDI for Advanced Manufacturing and auxiliary sectors in the long-term (4/4)



Near-shoring



Within the near-shoring trend, Ukraine may benefit from a close location to the EU, existing trade, and expected technical agreements to become a trusted supplier.

Supply chain optimization



Wide range of available resources, skilled but cheap workforce, favorable CPT, and other benefits of Ukraine allow optimizing supply chain costs for potential investors.

Lean/additive production



In most cases, we assume the creation of new production facilities through FDI, where it is easier to implement new lean / additive technologies (e.g., 3D-printing) rather than on existing plants.

Private professional education



High quality professional education is critical for Advanced Manufacturing production both to operate high-complex machines and ensure the required quality of products.

Mechanisms to achieve described FDI activators: 1) Industrial parks development, 2) Greenfield construction projects for new facilities, 3) Brownfield development of existing production facilities



2.4.6. Conclusions

International foreign investment electronics conferences and other electronics industry events

Event	Participants	Place	Next dates	Description
EBA Lviv Final Manufacturing Committee meeting in 2020	Experts will tell the participants about the “sore points” and try to find solutions on how to use the negative year experience to improve the companies business activities	Platforma Coworking Futura, Lviv Ukraine	December 11th, 2020	The conference focuses on challenges faced by manufacturing companies, including, but not limited to technology, in 2020, and experts will also share their own experience in problems overcoming that arose in the crisis situation, as well as the success that was achieved during the year.
UAFIN.TECH 2020	Over 50 speakers from 15 countries will discuss trends and new approaches in innovation and finance	Online (Kyiv, Ukraine)	December 18th, 2020	The third annual conference UAFIN.TECH 2020, dedicated to modern tools, methods and approaches to digital transformation of the financial sector and the evolution of the fintech ecosystem as a whole.
IEEE International Electron Devices Meeting	IEDM is an international conference, with strong representation from speakers from around the globe	Online (San Francisco, CA, The USA)	December 12th – 16th, 2020	World's preeminent forum for reporting technological breakthroughs in the areas of semiconductor and electronic device technology, design, manufacturing, physics, and modeling.
International Conference on Science, Engineering & Technology	More than 100 scientist, researchers, practitioners from both academia as well as industry to meet the share cutting-edge development in the field	Royal Olympic Hotel, Kyiv, Ukraine	December 17th – 18th, 2020	The conference will provide an excellent international forum for sharing knowledge and a result in Science, Engineering & Technology.
International Conference on Engineering and Technology	100 leading academics, researchers and practitioners, contributing to the global debate on research, science and innovation	Hotel Mercure London Bridge, London, UK	December 28th – 29th, 2020	The conference addresses the new advancements and challenges in the field of Engineering and Technology and aiming to provide an opportunistic forum and vibrant platform for researchers and industry practitioners to share their original research work and practical development experiences on specific new challenges and emerging issues.
International Conference on Recent Innovations in Engineering and Technology	More than 100 delegates will present novel and fundamental advances in the fields of Recent Innovations in Engineering and Technology	Online (Kyiv, Ukraine)	January 07th – 18th, 2021	The conference aims to be one of the leading international conferences for presenting novel and fundamental advances in the fields of Recent Innovations in Engineering and Technology.
International Conference on Design, Simulation, Manufacturing: The Innovation Exchange	Over 180 delegates from scientists, representatives from industry	Online (Kharkiv, Ukraine)	June 08th – 11th, 2021	Participances will meet to exchange ideas, establish business and personal relationships, identify new opportunities for cooperation, finding areas of innovation and joint efforts to address common projects in Manufacturing Engineering, Materials Engineering, Mechanical Engineering, and Chemical Engineering.
APTA Transform Conference & Expo	Representatives of more than 575 companies which are working in transportation industry	Anaheim CA, The USA	August 31st – September 3rd, 2021	Transportation industry trade show, which is held once every 3 years, is a location to witness the innovation in the industry. Some of the categories on display at this show are: sensors, automation, signage. Show officials expected over 15,000 attendees in 2020.
Railway Interchange	Members of Railway Supply Institute Railway Engineering Maintenance Suppliers Association Railway Systems Suppliers	Indianapolis, the USA	September 26th-29th, 2021	The conference is held every two years, Railway Interchange is the largest railway exhibition in North America. There one might see the latest technological breakthroughs in Railway industry.
IDS the International Dental Show	2000+ exhibitors from more than 500 countries	Cologne, Germany	September 22th – 25th, 2021	The conference is an international dental show which takes place every two years. It is the leading industry event for the dental technician products, traders and overall the dental industry. The detailed information about the latest technologies and developments in the market is presented.



2.4.6. Conclusions

International foreign investment Engineering and Heavy Machinery conferences and other industry events

Event	Participants	Place	Next dates	Description
CVF OFF Highway	350 delegates from Agriculture, Industrial, Construction, Earthmoving and Mining industry will discuss trends, developments and issues facing the Indian Heavy Machinery	The Leela Ambience Gurugram Hotel & Residences, Gurgaon, India	December 17th, 2020	CVF OFF Highway will discuss the industry trends, developments and issues facing the Indian Off Highway equipment markets, such as Agriculture, Industrial, Construction, Earthmoving and Mining.
International conference on Progress in Mechanical and Aerospace Engineering	The aim as well as objective of PMAE 2020 is to present the latest research and results of scientists related to Mechanical and Aerospace Engineering topics	Ho Chi Minh, Vietnam	December 28th – 29th, 2020	This conference provides opportunities for the delegates to exchange new ideas face-to-face, to establish business or research relations as well as to find global partners for future collaborations.
What are 5 Challenges RF Cable Assembly Face in the Space Industry?	Experts will discuss issues with designing and manufacturing RF cable assemblies and harnesses	Online (Kyiv, Ukraine)	January 21th, 2021	Today's RF cable assembly manufacturers are developing high-reliability integrated assemblies and harnesses to suit a variety of space applications and missions.
Heavy Duty Aftermarket Dialogue	HDAD brings together thought leaders from all segments of the Heavy Duty Aftermarket Industry who can share applied knowledge on the state of the marketplace and what steps are necessary to be sustainable and prosperous as the industry evolves	Online (Kyiv, Ukraine)	January 25th, 2021	Conference focuses on the heavy duty aftermarket supplier industry, intended to provide an in-depth view of the prospects for the global, heavy duty industry's aftermarket component for the next 5 years.
Metal Stamping and Tool & Die Conference	Over 100 speakers will provide breakout sessions for stamping tools.	Sheraton Music City Hotel, Nashville, USA	January 26th – 27th, 2021	Track sessions will feature new, emerging, evolving and maturing technologies and industry trends that are impactful to metal stamping, die design and die construction companies.
EPIC Online Technology Meeting with Special Focus on Photonics for Robotics	During these online technology meetings, up-to 100 experts will look for the challenges the industry is facing and will bring together the entire supply chain to address these challenges.	Online (Kyiv, Ukraine)	February 01th, 2021	The conference concentrate on the needs of the robotics industry concerning sensor development, novel artificial-intelligence technologies, special high-resolution vision systems in order to serve the industry of today and tomorrow.
Connected Manufacturing Leaders Summit	~500 delegates will discuss break-point trends in the Automotive, Aerospace, Electronics, Metals & Mining	Hilton Munich Park, Munich, Germany	February 09th – 10th, 2021	The Smart Manufacturing Leaders Summit provides the attendees with insights relating to the sectors of Automotive, Aerospace, Electronics, Metals & Mining and much more.
International Aerospace, Mechanical, Automotive and Materials Engineering Conference	~500 speakers from the following industries: Aerospace, Mechanical, Automotive, and Materials Engineering	Pacific Regency Hotel Suites, Kuala Lumpur, Malaysia	February 10th – 11th, 2021	The Conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results on all aspects of Aerospace, Mechanical, Automotive, and Materials Engineering.
International Conference on Mechanical Manufacturing and Industrial Engineering	The exports will present the latest research and results of scientists related to Mechanical Manufacturing and Industrial Engineering topics	Chengdu, China	June 26th – 28th, 2021	MMIE provides a forum for accessing to the most up-to-date and authoritative knowledge from both industrial and academic worlds, sharing best practice in the field of Mechanical Manufacturing and Industrial Engineering. The meeting will provide an opportunity to highlight recent developments and to identify emerging and future areas of growth in this exciting field.

Source: organizers' websites and other open sources



2.4.6. Conclusions

International foreign investment automotive conferences and other automotive electronics industry events

Event	Participants	Place	Next dates	Description
Oxford EV Summit	Oxford EV Summit brings together business leaders and key players working on electric vehicles, energy, information technology and charging infrastructure, to explore how we advance full e-mobility.	Said Business School, Oxford, UK	Postponed	The summit is a high level business forum based on the dual themes of business engagement and thought leadership from the most senior, influential and informed people in the sector.
International Conference on Automobile & Mechanical Engineering	The conference will bring together from 100 to 500 leading researchers, engineers, and scientists in the domain of interest from around the world	Radisson Blu, Abu Dhabi Yas Island, Abu Dhabi, UAE	December 28th – 29th, 2020	The International Conference on Automobile & Mechanical Engineering will provide a leading forum for the presentation of new advances and research results in the fields of Automobile & Mechanical Engineering.
Annual Automotive Thermal Management Conference	Annual Automotive Thermal Management Conference will bring together up-to 100 world's top – class automotive senior executives keen to share their knowledge and experience in the area and to give you an opportunity discuss current and upcoming challenges in the industry	Munich, Germany	January 21th - 22th, 2021	Automotive Thermal Management Conference will highlight the challenges opportunities and emerging innovations, alternative drive, battery thermal management, enhancing thermal management for HEV and e-cars, innovative thermal management components and materials, CO2 reduction, alternative and environmentally friendly refrigerants.
Automotive Meetings Digital Week	100 speakers will provide an understanding of the industry landscape and needs from the local market, tips on how to best enter the market, and what are the opportunities for potential collaborations	Online (Kyiv, Ukraine)	January 25th - 29th, 2021	Auto Digital Week is an entire week to explore the global automotive supply chain. Each webinar will cover the industry challenges and opportunities of regional markets.
Battery Management Systems	Over 100 high-level cell engineers and R&D scientists will discuss monitoring state-of-health, state-of-charge, designing internal battery pack topology, new monitoring methods, balancing mechanisms and simplifying circuitry to develop long-lasting and reliable batteries	Online (Kyiv, Ukraine)	March 10th – 11th, 2021	The Battery Management Systems conference explores the challenge of creating a safe and reliable battery management system. As the need for increased capacity and lifespan of lithium-ion batteries continues to grow, creating a safe and reliable battery management system is one of the biggest challenges facing battery engineers.
International Conference on Alternative Fuels and Electric Vehicles	From 100 to 500 delegates will discuss trends in the Alternative Fuels and Electric Vehicles	Alard College of Engineering and Management, Pune, India	February 04th - 05th, 2021	International Conference on Alternative Fuels and Electric Vehicles will provide a platform for various worldwide researchers, scientists, and academicians engaged in the field of alternative fuels, electric vehicles and driving the world towards a sustainable future.
Annual Automotive Lightweight Materials Conference	Up-to 100 delegates will focus on possible ways to development of lightweight components and materials for automotive industry	Berlin, Germany	February 04th - 05th, 2021	Annual Automotive Lightweight Materials Conference will be focusing on key questions of designing lightweight components and materials, moulding and processing technologies for automotive weight reduction, optimal combination of high strength steel, aluminium and reinforced plastics, new regulatory standards on safety.
Automotive Forum	Experts will discuss perspectives on how the events of the past will influence the future in the sectors of automotive	Grand Hyatt New York, New York, USA	March 30th 2021	Automotive Forum is an annual conference for business leaders to learn and discuss the future of the automotive market. The conference will cover areas like global economic outlook, to that of the upper end of luxury and how to conquer high end buyers.
International Business Convention for Innovative Vehicle & Transportation	The conference sessions will bring together the vehicle and transportation community to explore the key challenges and opportunities of the future new vehicle technologies	Officine Grandi Riparazioni, Turin, Italy	March 30th - 31th, 2021	International Business Convention for Innovative Vehicle & Transportation is a new mobility technology event that brings together the vehicle and transportation community: from vehicle producers and tier suppliers to mobility decision-makers, technology entrepreneurs and solution providers.

Source: organizers' websites and other open sources

Annexes



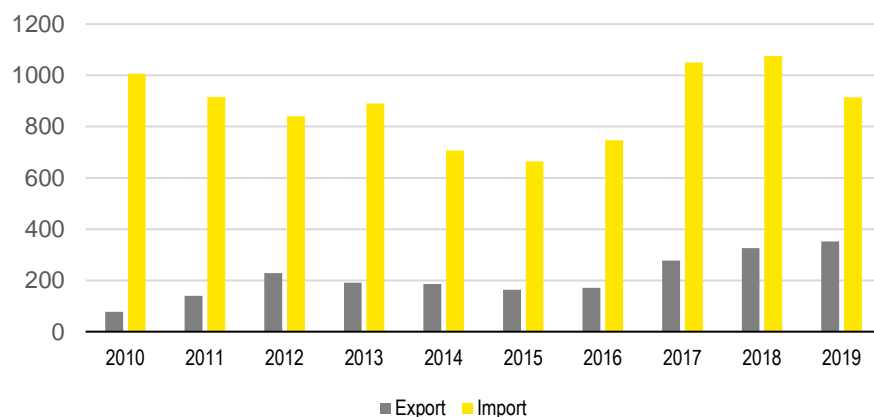
Glossary, Benchmarking Indices and Limitations



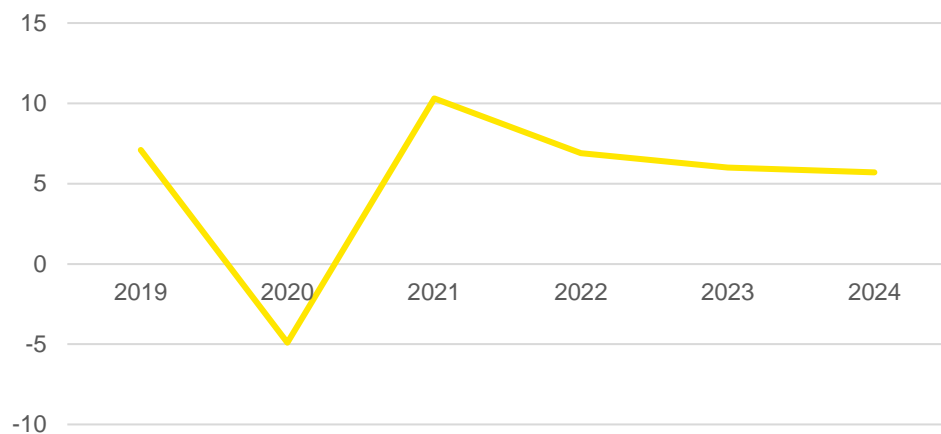
Annexes

Communications equipment snapshot

Foreign trade of communications equipment in Ukraine, USD m



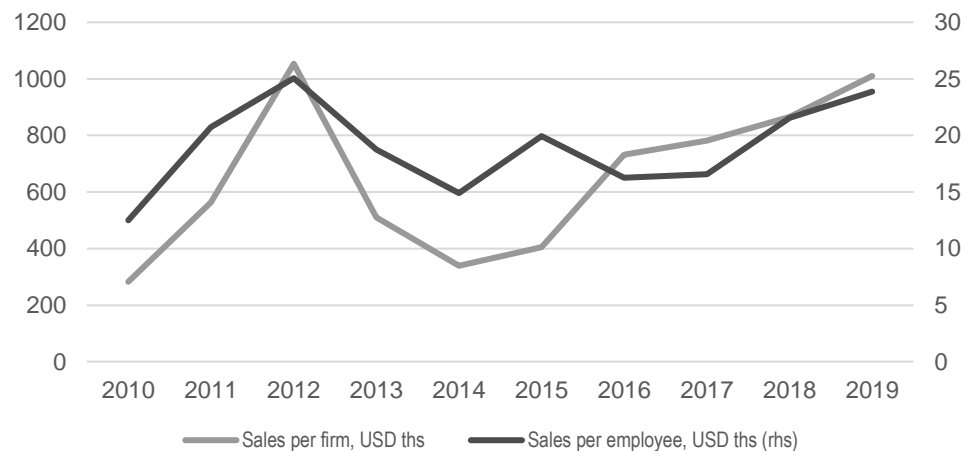
Annual growth forecast in communications equipment in Ukraine, %



Source: Oxfords Economics

Subsector products based on KVED 26.3: communication equipment (telephones, radar, radio navigation devices and remote control radio equipment, microphones, loudspeakers, sound recording and reproducing equipment, video equipment, TV receiving equipment)

Productivity in communications equipment



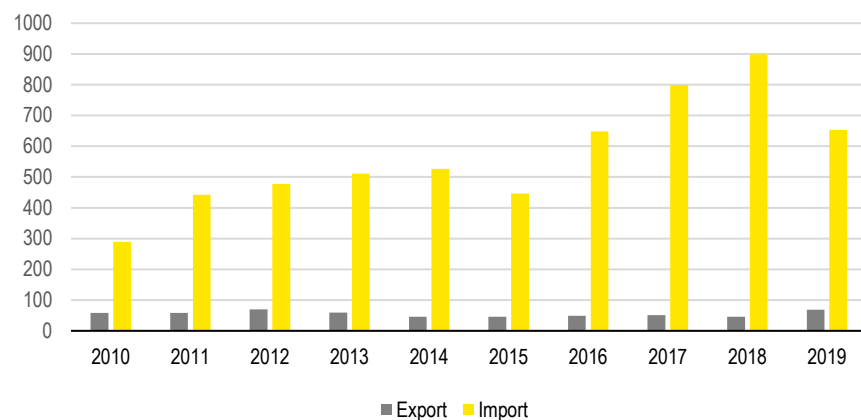
Source: State Statistical Service of Ukraine



Annexes

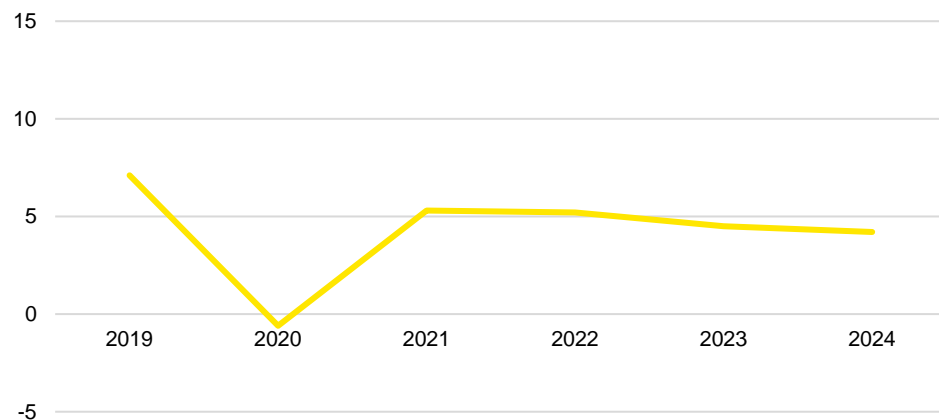
Electronics: computer and peripheral snapshot

Foreign trade of computer and peripheral equipment in Ukraine, USD m



Source: ITC Trademap

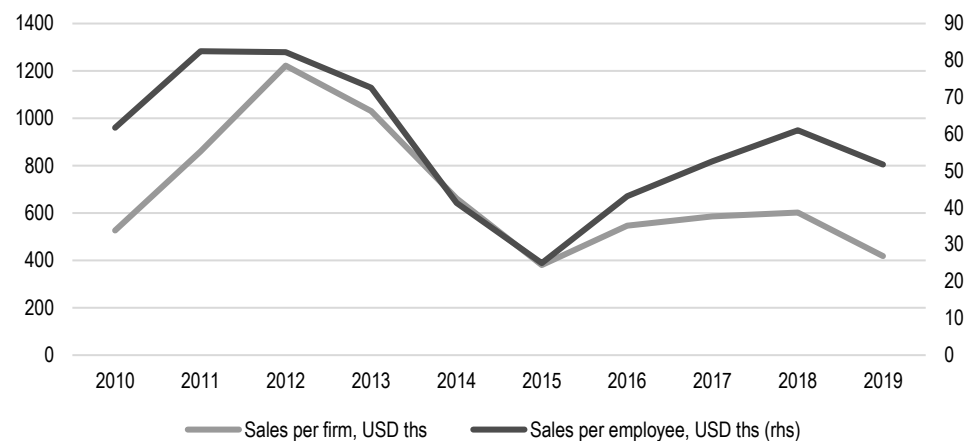
Annual growth forecast in computer and peripheral equipment in Ukraine, %



Source: Oxfords Economics

Subsector products based on KVED 26.2: computers and peripheral equipment (automatic information processing machines and their units, machines for data transfer on data carriers etc). Note: KVED 28.23 (office machines) has been moved to this subsector from heavy Machinery to Electronics.

Productivity in computer and peripheral equipment



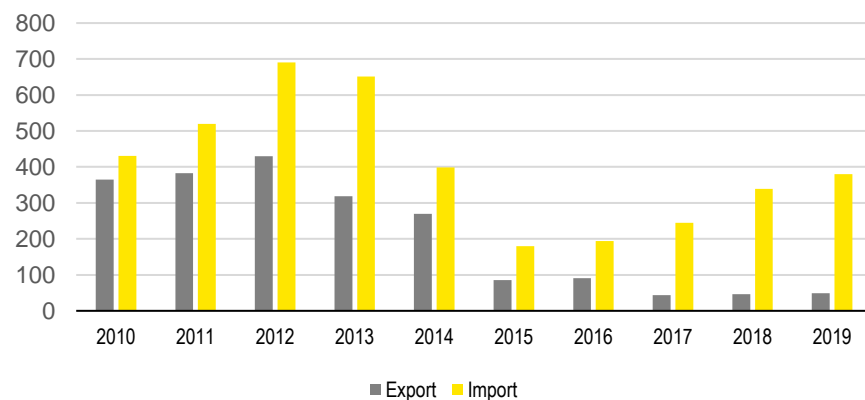
Source: State Statistical Service of Ukraine



Annexes

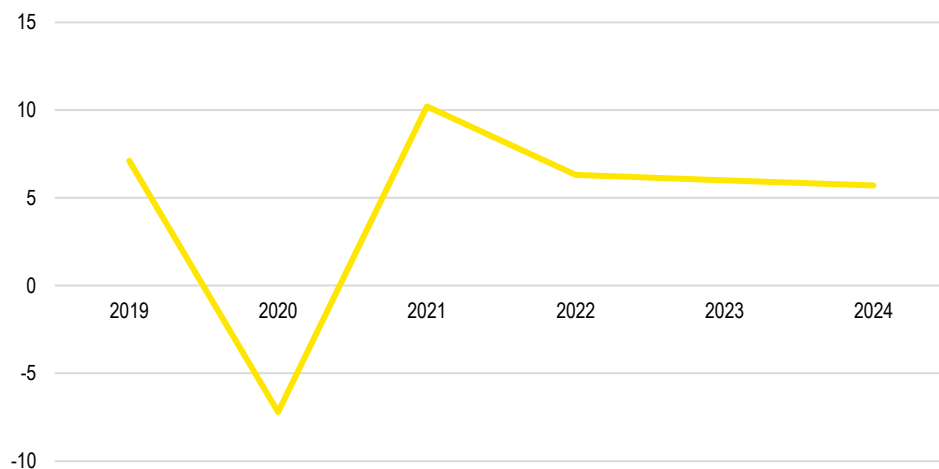
Electronics: audio and video equipment snapshot

Foreign trade of audio and video equipment in Ukraine, USD m



Source: ITC Trademap

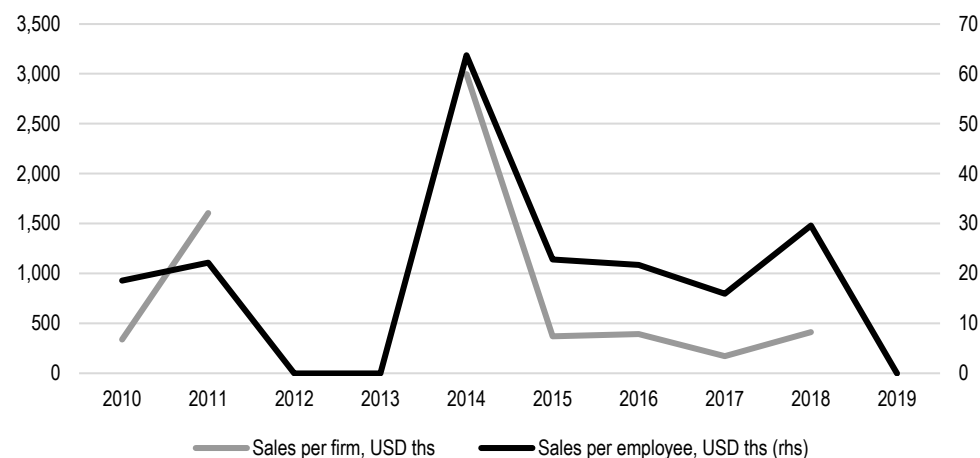
Annual growth forecast in audio and video equipment in Ukraine, %



Source: Oxfords Economics

Subsector products based on KVED 26.4: consumer electronics for receiving, recording and reproducing sound and images, The subsector does not include magnetic and optical disks production

Productivity in audio and video equipment



Source: State Statistical Service of Ukraine



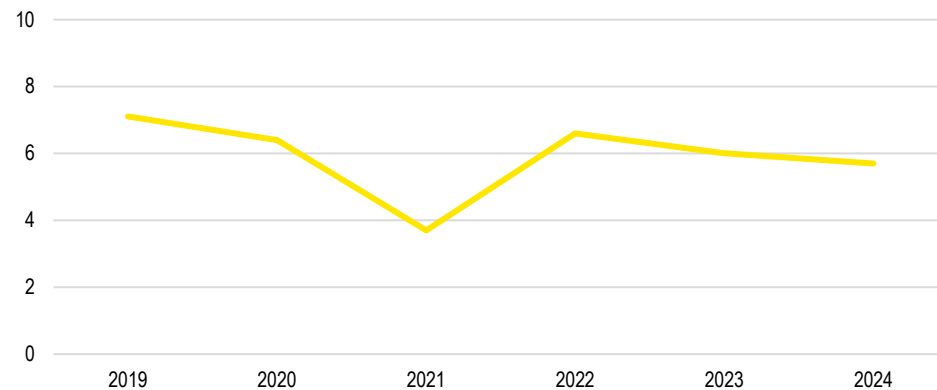
Annexes

Electronics: electromedical equipment snapshot

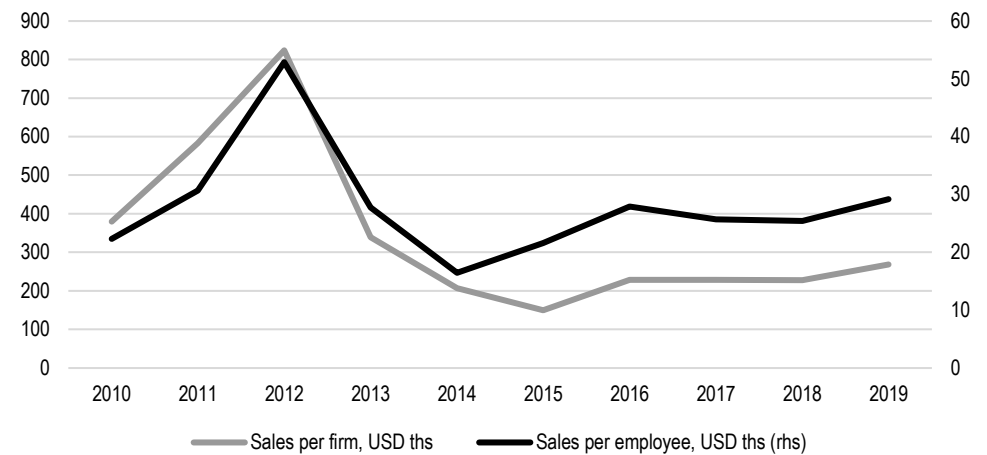
Foreign trade of electromedical equipment in Ukraine, USD m



Annual growth forecast in electromedical equipment in Ukraine, %



Productivity in electromedical equipment



Source: Oxford Economics

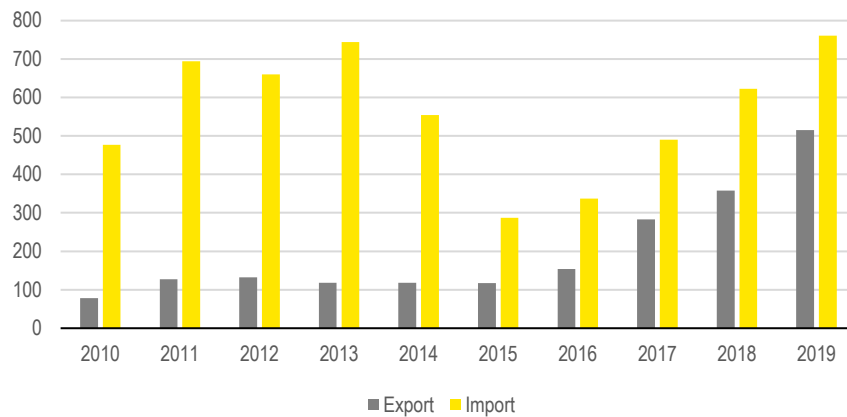
Subsector products based on KVED: instruments and equipment for measurement, research and navigation (gas, water and electricity meters etc), radiological, electromedical and electrotherapeutic equipment (instruments and appliances used in medicine, equipment for mechanotherapy and massage, equipment using X-ray, alpha, beta or gamma radiation in medicine etc)



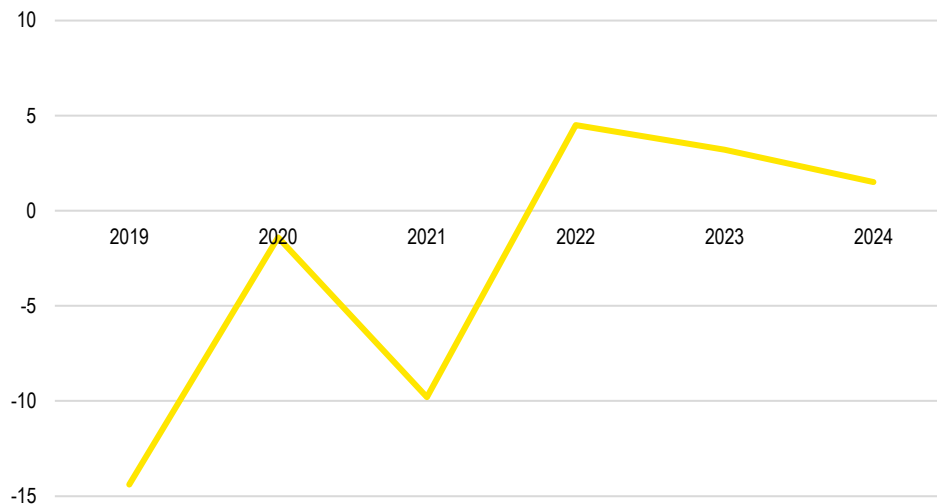
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Electronics: household appliances snapshot

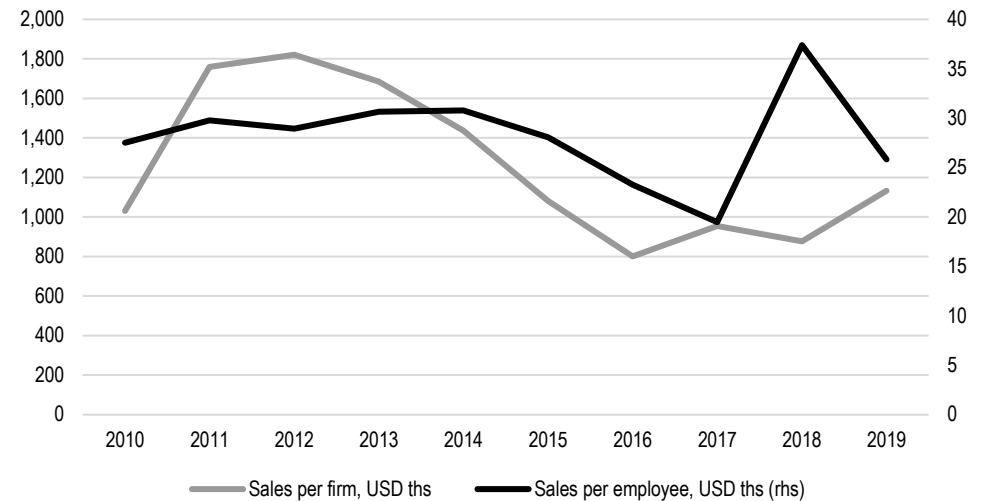
Foreign trade of household appliances in Ukraine, USD m



Annual growth forecast in household appliances in Ukraine, %



Productivity in household appliances



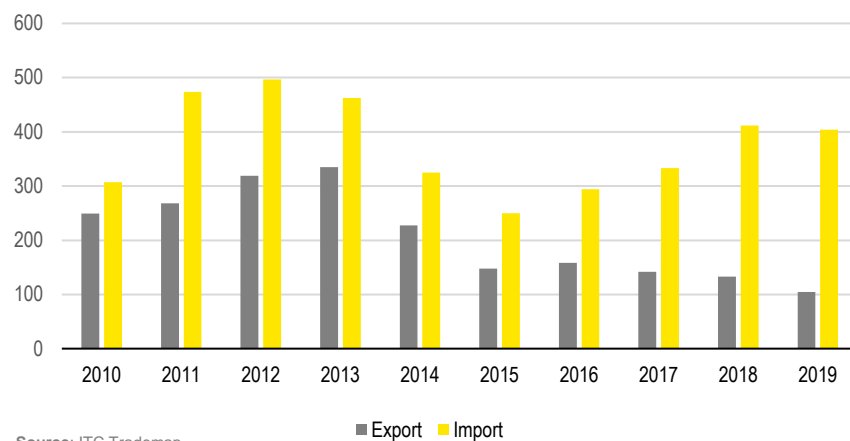
Source: Oxford Economics



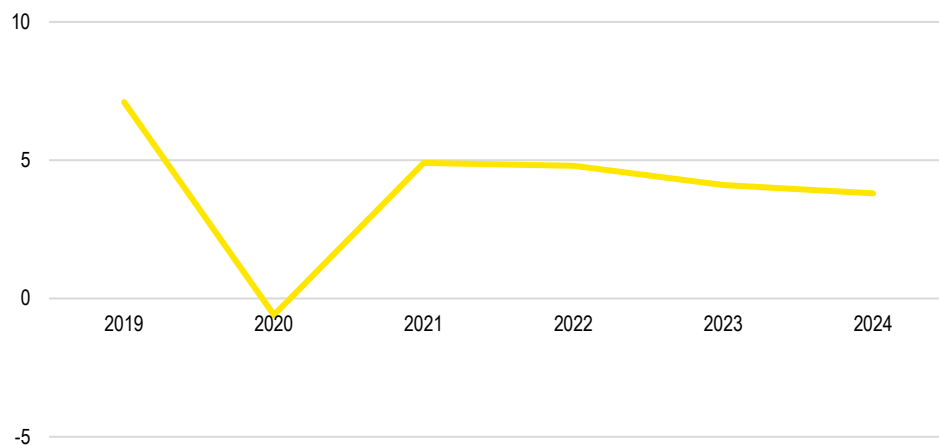
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Electronics: scientific instruments snapshot

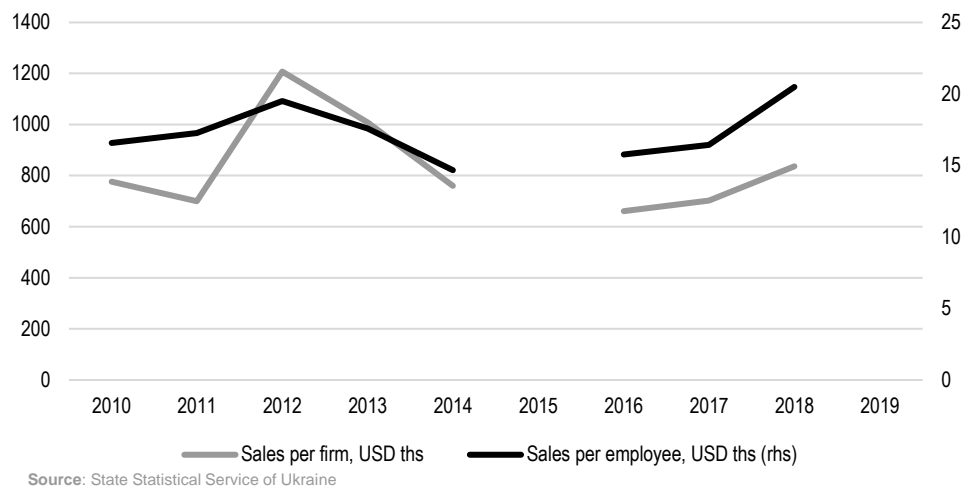
Foreign trade of scientific instruments in Ukraine, USD m



Annual growth forecast in scientific instruments in Ukraine, %



Productivity in scientific instruments





Annexes

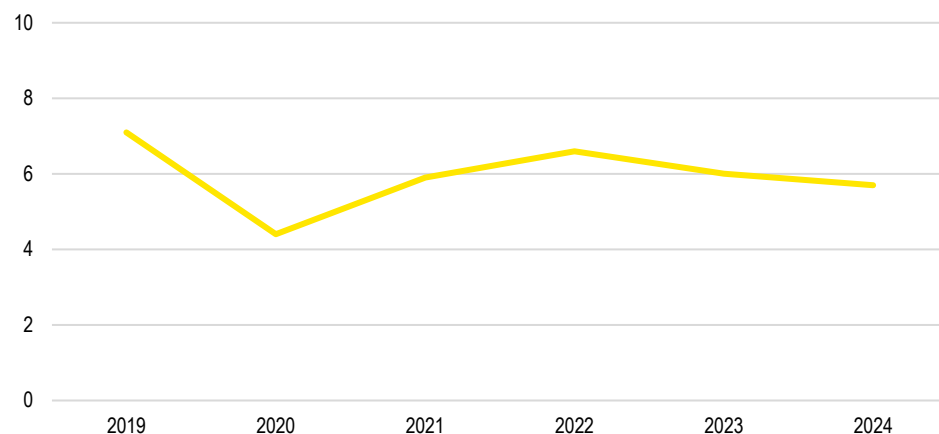
Electronics: printed circuit boards and components snapshot

Foreign trade of boards and components in Ukraine, USD m



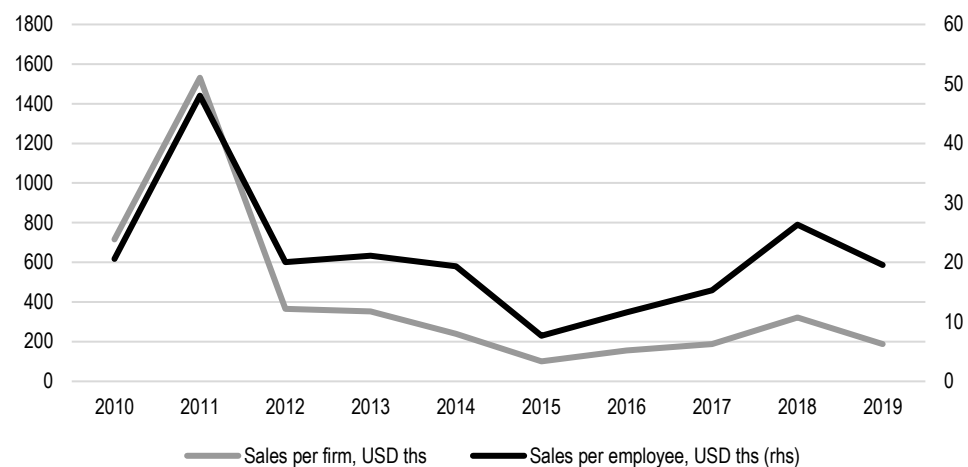
Source: ITC Trademap

Annual growth forecast in boards and components in Ukraine, %



Source: Oxfords Economics

Productivity in boards and components



Source: State Statistical Service of Ukraine

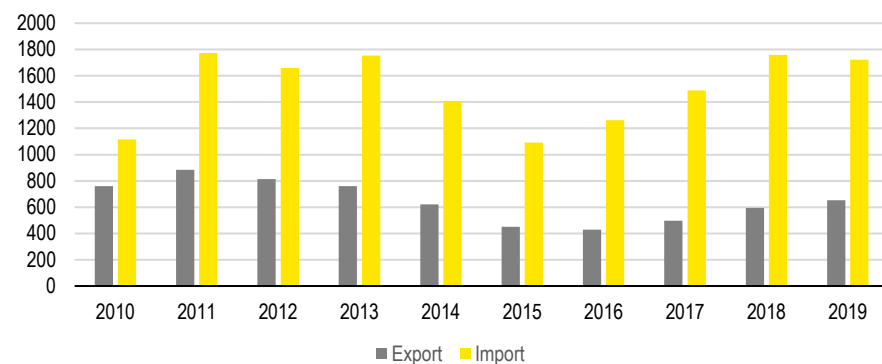
Subsector products based on KVED: electric motors, generators and transformers, electrical distribution and control equipment, batteries and accumulators, fiber-optic cables and other electric cables, electric lighting equipment, other electrical devices



Annexes

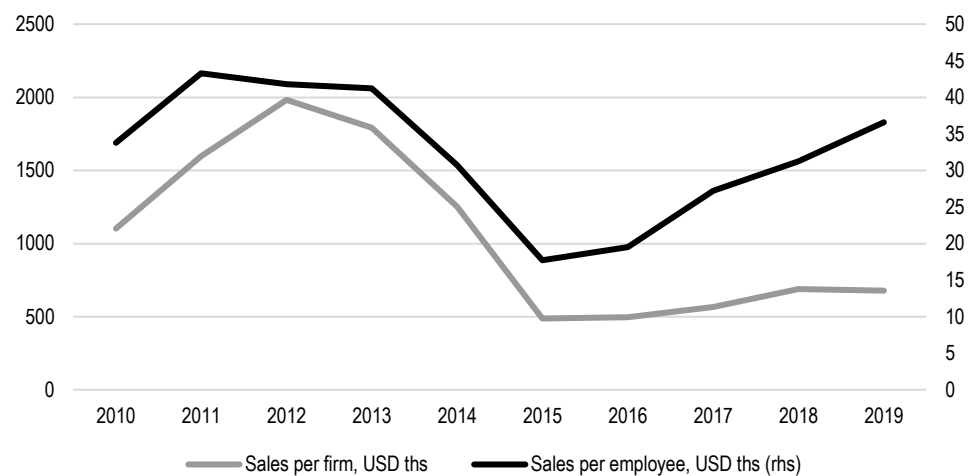
Electronics: electric equipment snapshot

Foreign trade of electric equipment in Ukraine, USD m



Source: ITC Trademap

Productivity in electric equipment



Source: State Statistical Service of Ukraine



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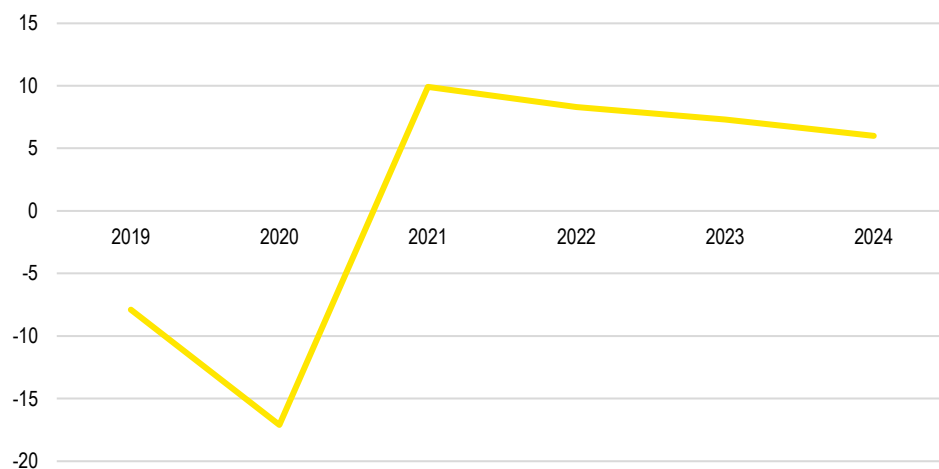
Engineering: aerospace products and parts snapshot

Top companies in aerospace industry in Ukraine

Company	Founded	FDI	Sales 2019, USD m	Sales, CAGR, 2014-2019	Personnel
Motor Sich	1994	no	417.2	-13%	27,320
Southern machine building plant im Makarova	2000	no	39.2	-5%	6,599
Lutsk repair plant "Motor"	1992	no	32	-1%	1,145
Lviv state plane repair plant	1998	no	27.7	7%	912
FED	2007	no	25.6	-10%	919
Plant 401 civic aviation	1993	no	25.6	-4%	1,032
Kharkiv machine building plant "FED"	1991	no	22.7	-14%	1,886
Konotop plane repair plant "Aviacon"	1998	no	21.8	-19%	939
Odessa aviation plant	1998	no	17.2	-2%	811

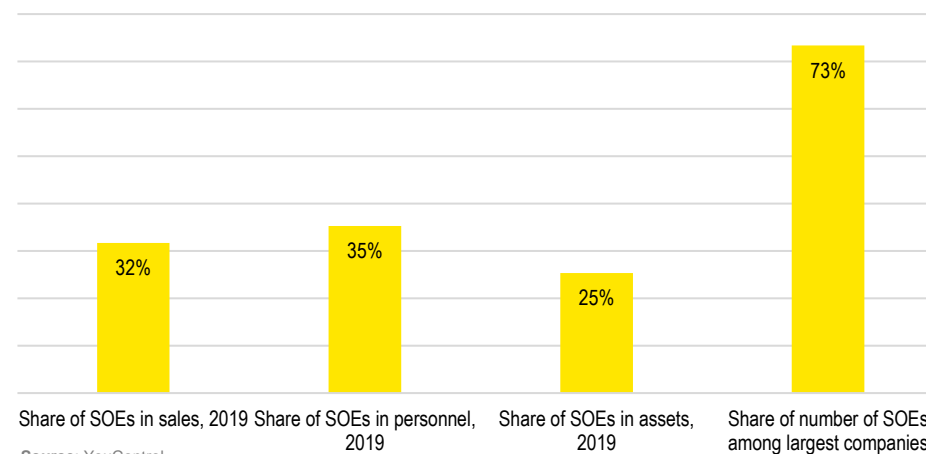
Source: YouControl

Annual growth forecast in aerospace products and parts in Ukraine, %



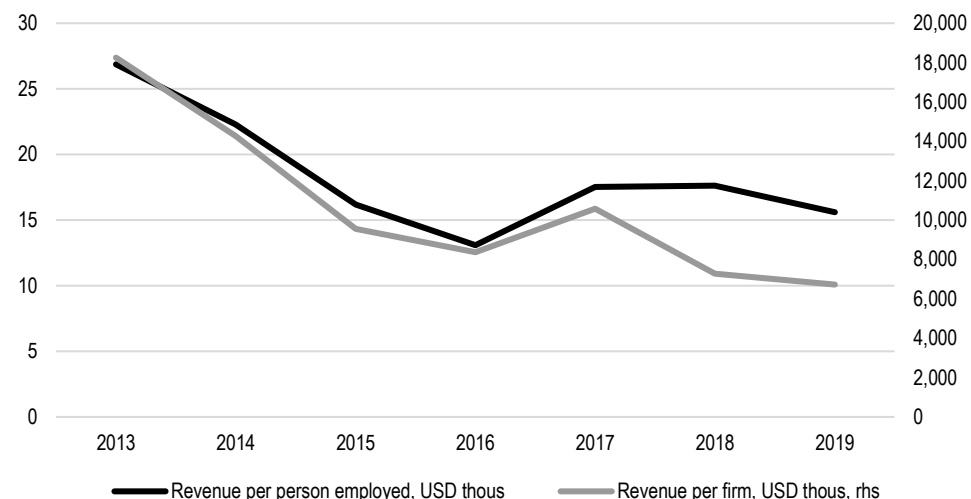
Source: Oxfords Economics

Share of SOE in aerospace products and parts



Source: YouControl

Productivity in aerospace products and parts



Source: State Statistical Service of Ukraine



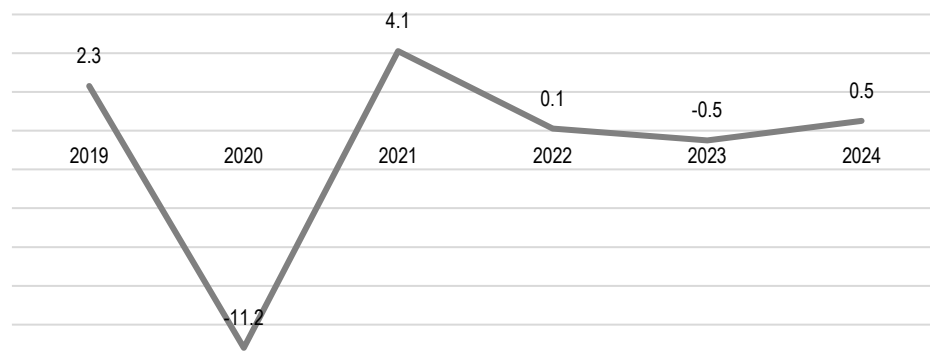
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Engineering: agriculture, construction, and mining machinery snapshot

Top companies in agriculture, construction, and mining machinery industry in Ukraine

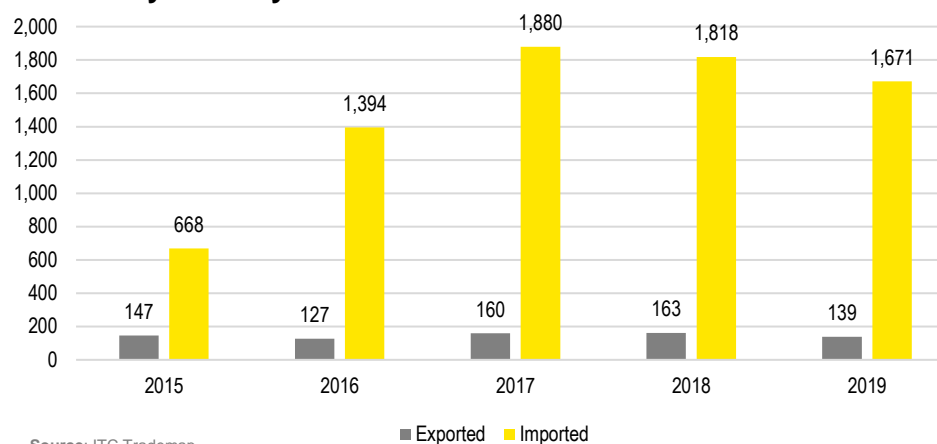
Company	Founded	FDI	Sales 2019, USD m	Sales, CAGR, 2014- 2019	Personnel
Svitlo shakhtaria	1994	no	57,2	6%	1 980
Ukrautozapchastina	2000	no	48,7	-11%	681
Kremenchuk plant of road machines	2000	no	41,3	2%	2 038
Mining transport company	2003	no	35,8	9%	164
Frunze plant	1991	no	34,5	1%	398
Kharkiv tractor plant	1994	no	32,8	-10%	1 603
Elvorti	1994	no	29,9	-2%	1 104

Annual growth forecast in agriculture, construction, and mining machinery industry in Ukraine, %



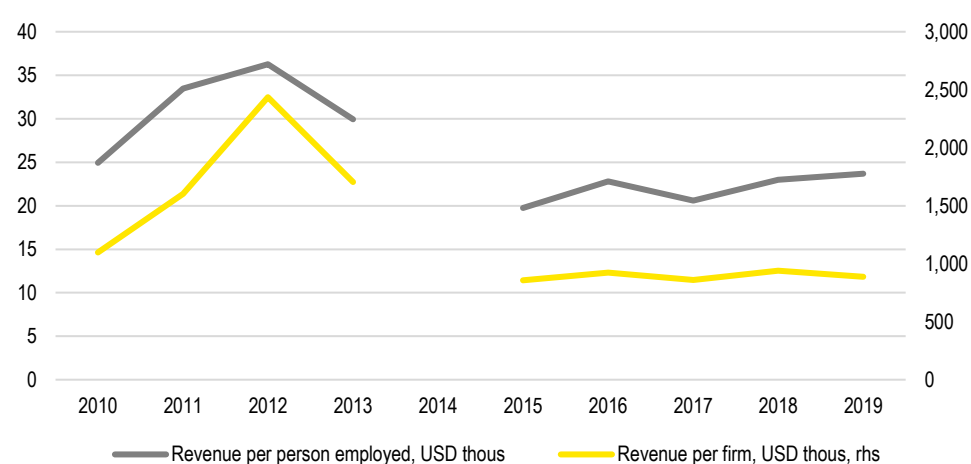
Source: Oxfords Economics

Foreign trade in agriculture, construction, and mining machinery industry



Source: ITC Trademap

Productivity in agriculture, construction, and mining machinery industry



Source: State Statistical Service of Ukraine



Annexes

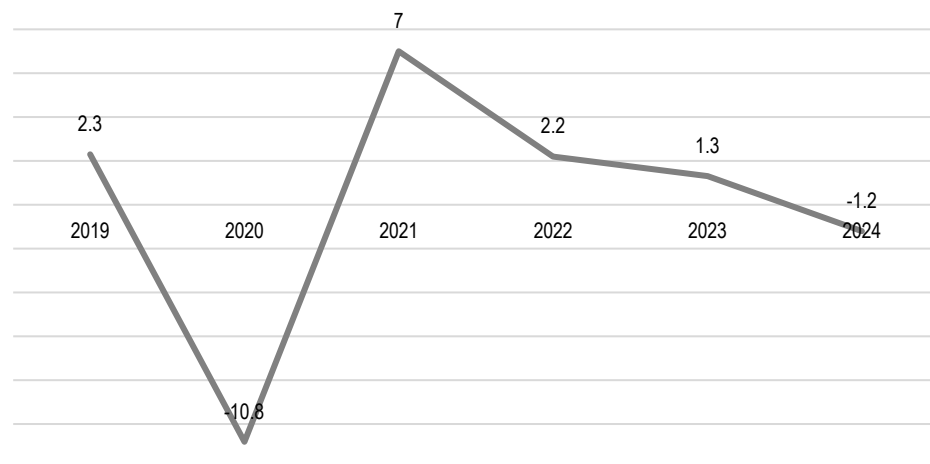
Engineering: other special purpose machinery snapshot

Top companies in other special purpose machinery in Ukraine

Company	Founded	FDI	Sales 2019, USD m	Sales, CAGR, 2014-2019	Personnel
Spectekhosnastka	2004	no	21.0	7%	511
Demetra-Agro	2011	no	17.2	10%	56
Berdychev machine building plant "Progress"	1996	no	15.0	12%	1,023
Kalyniv machine building plant	2001	no	12.1	24%	129
Mann+Hummel Filtration Technology Ukraine	2005	Germany	12.1	1%	383

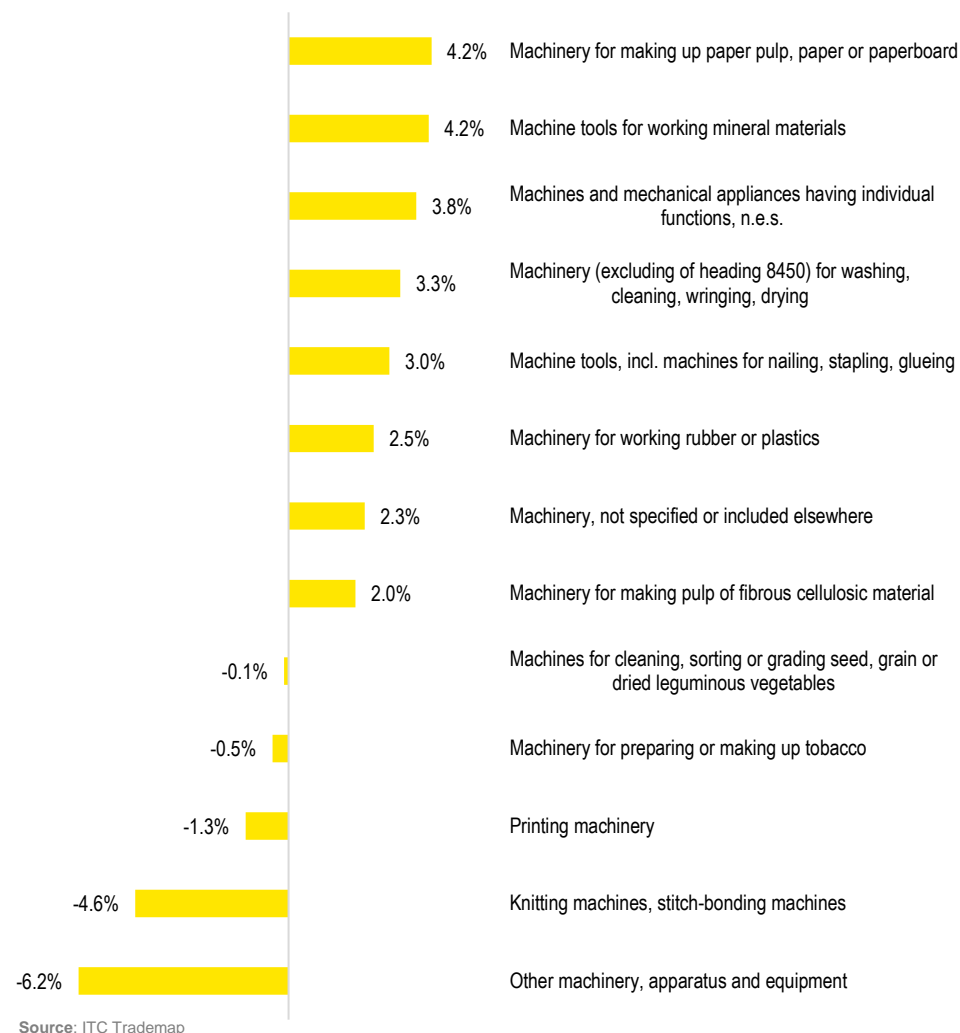
Source: YouControl

Annual growth forecast in other special purpose machinery in Ukraine, %



Source: Oxfords Economics

World import CAGR 2015-2019, %



Source: ITC Trademap



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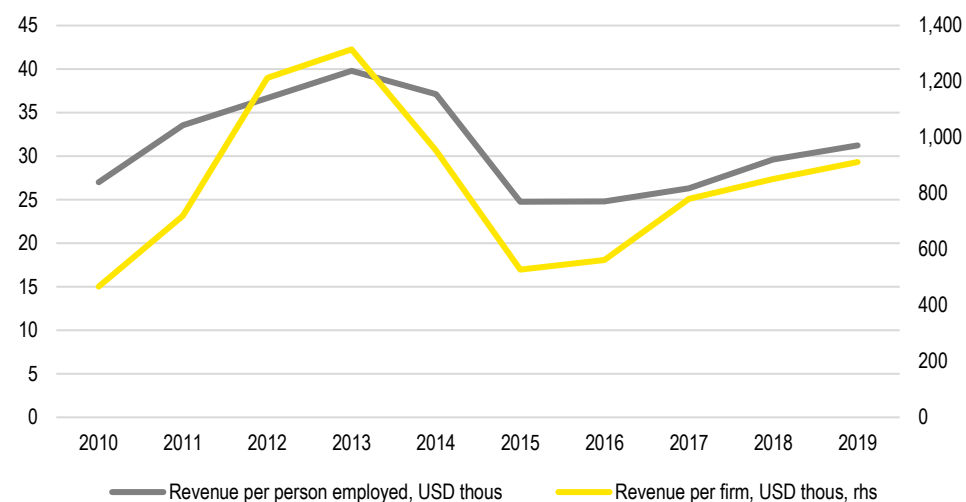
Engineering: ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing snapshot

Top companies in ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing in Ukraine

Company	Founded	FDI	Sales 2019, USD m	Sales, CAGR
Ukpostach	2001	EBRD (25%)	52.9	-11%
Vent-Service	2008	no	25.6	17%
TETSM-Alliance	2011	no	15.0	24%
Yuka-Invest	2006	Poland (20%)	12.9	3%
Ecuator plant	1995	no	10.0	-13%
Krasiliv assembly plant	1995	no	8.3	-9%

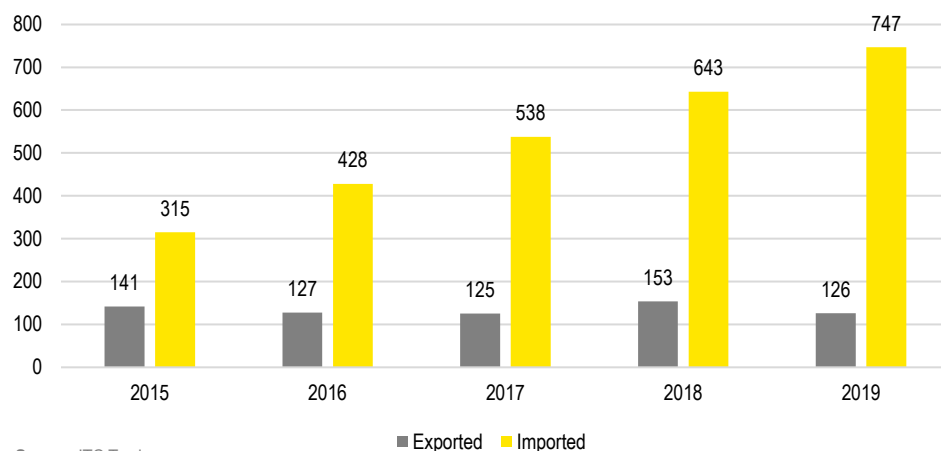
Source: YouControl

Productivity in ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing



Source: State Statistical Service of Ukraine

Foreign trade in ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing in Ukraine



Source: ITC Trademap



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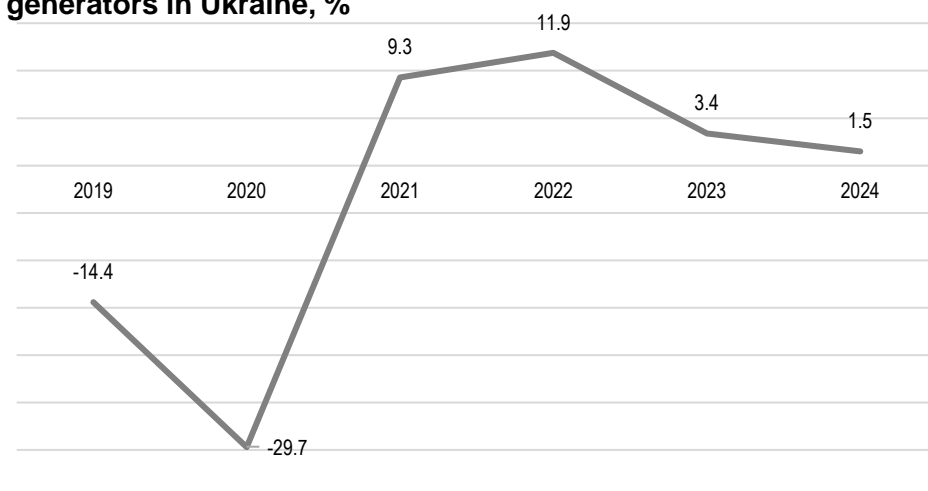
Engineering: engines, turbines and power generators snapshot

Top companies in engines, turbines and power generators in Ukraine

Company	Founded	FDI	Sales 2019, USD m	Sales, CAGR, 2014-2019	Personnel
Zorya - Mashproject	2005	no	146.1	-9%	10,848
Turboatom	1992	no	120.7	-5%	3,501
Electrovazhmash	1991	no	78.4	-13%	4,307
SKF Ukraine	1992	Sweden	69.9	-5%	1,344
Nasosenergomash	1997	Russia	61.4	-8%	2,868
Hydrosila *	1992	no	58.2	0%	2,588
Zaporizhtramsformator	1994	no	52.9	-14%	2,498

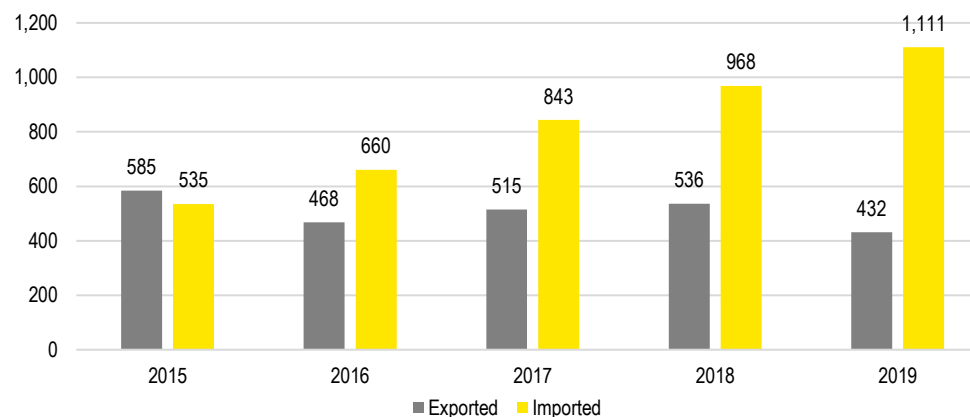
Source: YouControl, * - several legal entities

Annual growth forecast in engines, turbines and power generators in Ukraine, %



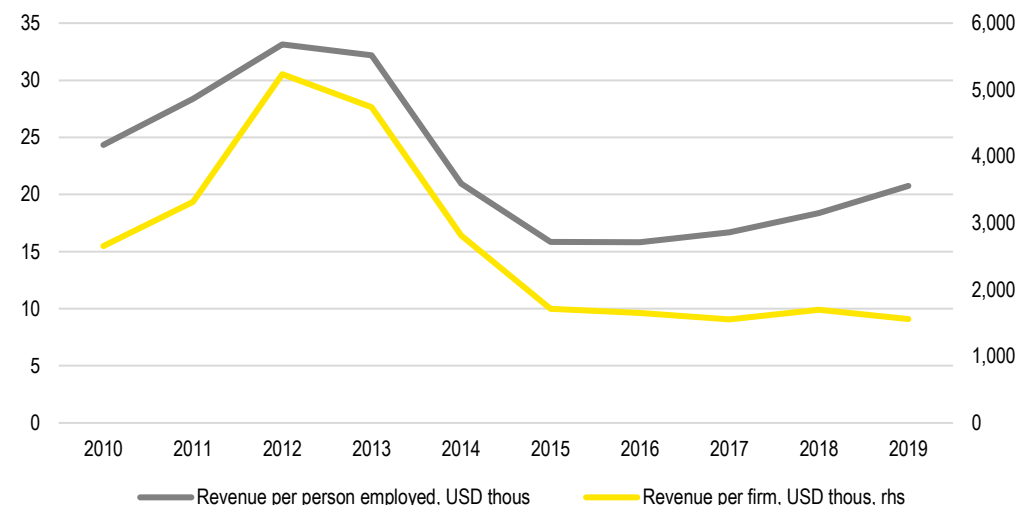
Source: Oxfords Economics

Foreign trade in engines, turbines and power generators



Source: ITC Trademap

Productivity in engines, turbines and power generators



Source: State Statistical Service of Ukraine



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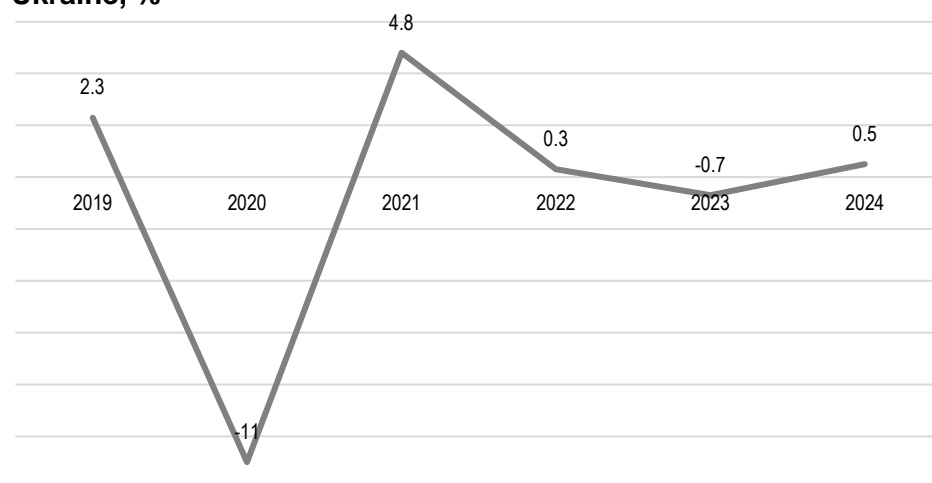
Engineering: other general purpose machinery snapshot

Top companies in other general purpose machinery in Ukraine

Company	Founded	FDI	Sales, 2019, USD m	Sales, CAGR, 2014-2019	Personnel
Otis	1998	United States	25,2	-13%	514
Lubnymash	2011	no	17,6	21%	434
Karat-Liftkomplekt	2002	no	13,3	17%	239
Slovyansk machine plant	1996	no	11,6	13%	531
Kharkiv plant of lifting equipment	1996	no	10,8	1%	548
Konecranes Ukraine	1993	Finland	4,9	-17%	95

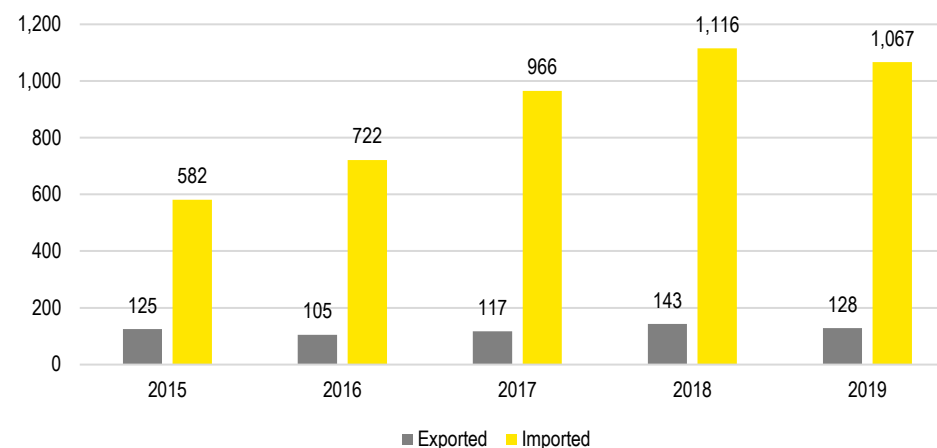
Source: YouControl

Annual growth forecast in other general purpose machinery in Ukraine, %



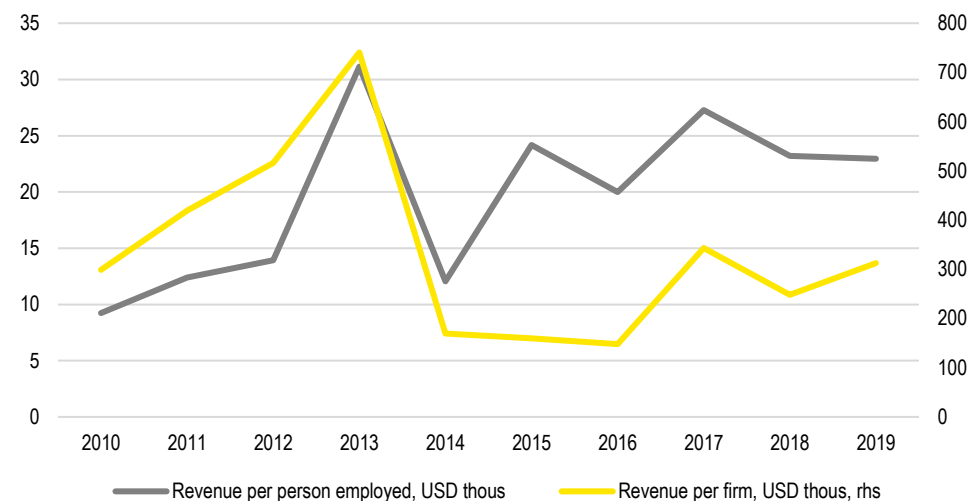
Source: Oxfords Economics

Foreign trade in other general purpose machinery in Ukraine



Source: ITC Trademap

Productivity in other general purpose machinery



Source: State Statistical Service of Ukraine



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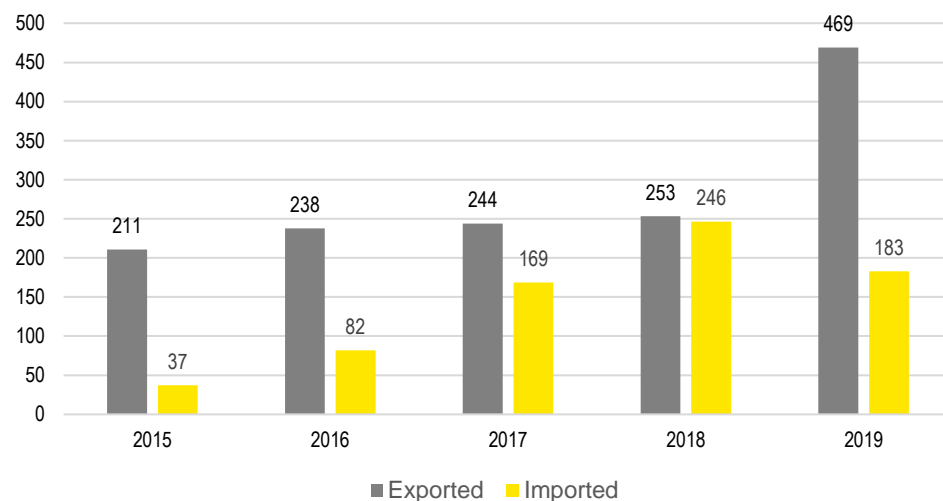
Engineering: railroad rolling stock snapshot

Top companies in railroad rolling stock in Ukraine

Company	Founded	FDI	Sales 2019, USD m	Sales, CAGR
Kryukovskiy carriage building plant	1993	no	353.7	8%
Dniprovagonmash	1995	no	120.7	30%
Kremenchuk steel plant	1995	no	40.2	14%
Lviv locomotive repair plant	2001	no	13.3	-11%
Locomotiveremservice	2006	no	9.1	3%

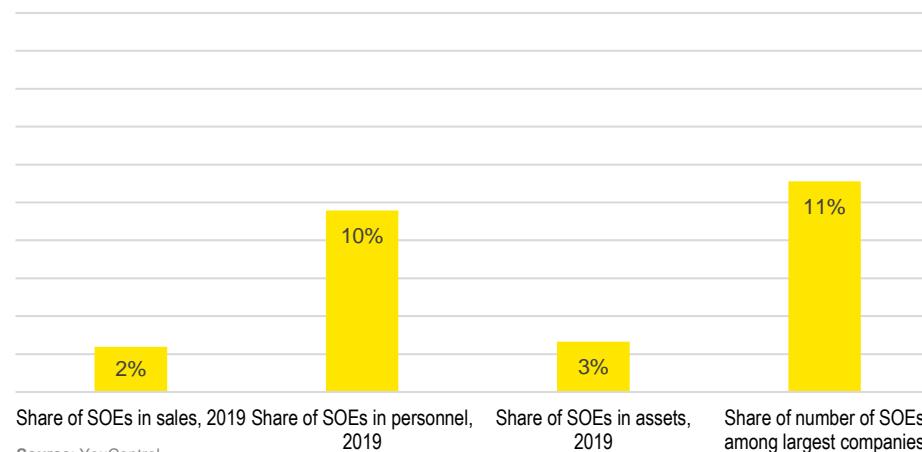
Source: YouControl

Foreign trade in railroad rolling stock in Ukraine

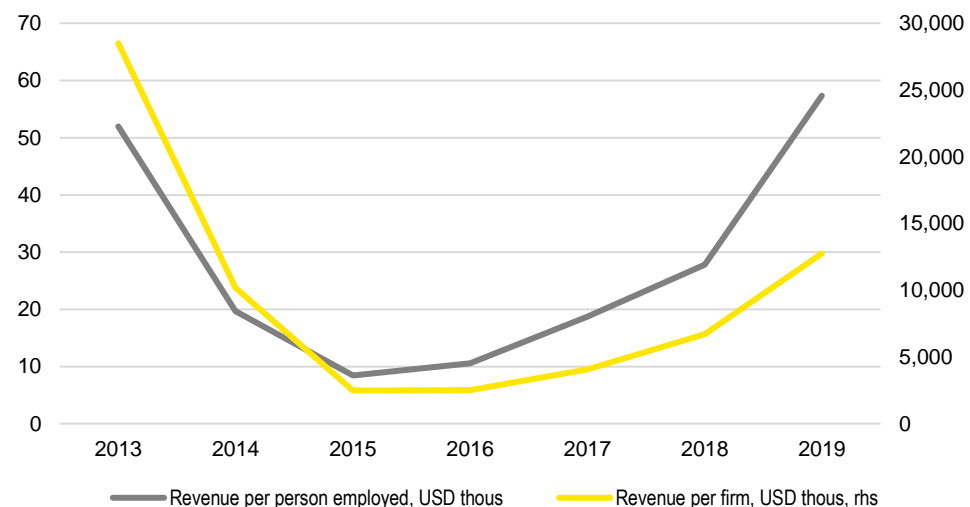


Source: ITC Trademap

Share of SOE in railroad rolling stock



Productivity in railroad rolling stock





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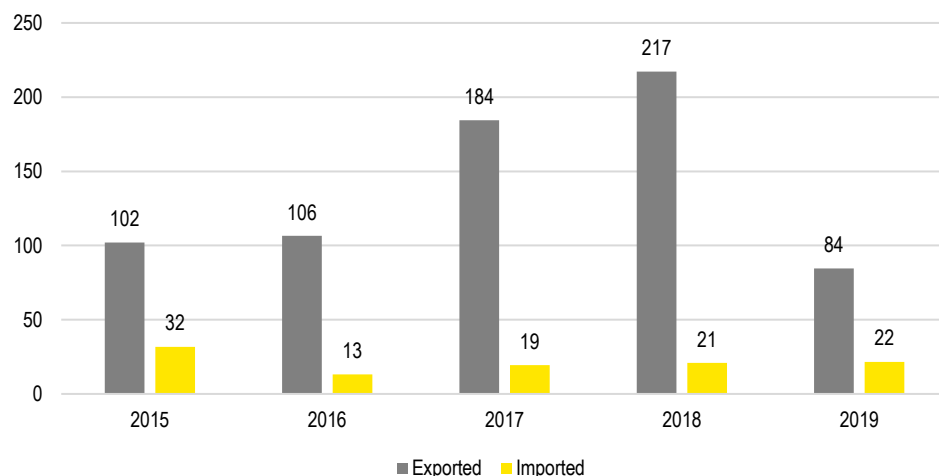
Engineering: ship and boat building snapshot

Top companies ship and boat building in Ukraine

Company	Founded	FDI	Sales 2019, USD m	Sales, CAGR, 2014-2019	Personnel
Ribalskiy shipyard	1996	no	48.7	109%	531
Brig	1993	no	19.3	18%	250
Smart-Maritime Group	2009	no	18.0	52%	1,132
Grand Marine	2001	no	10.0	36%	193
Seagran	1995	no	7.8	47%	67

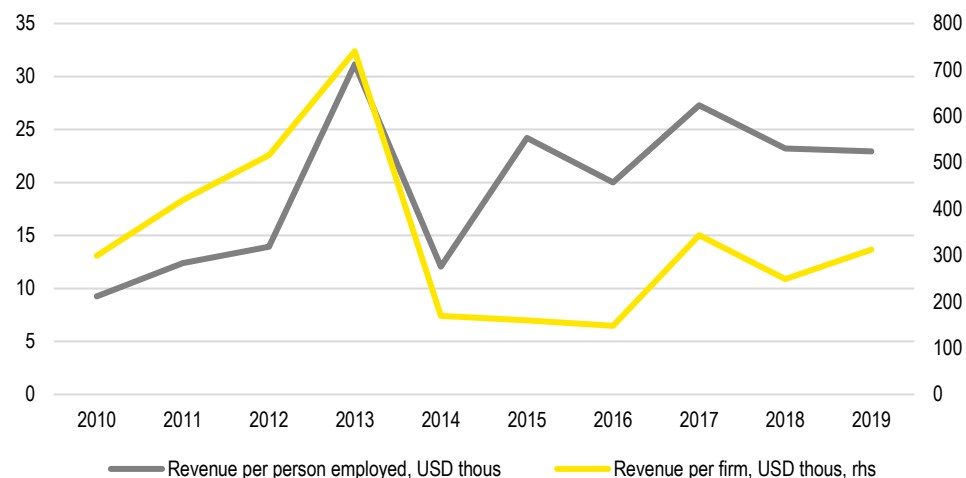
Source: YouControl

Foreign trade in ship and boat building in Ukraine



Source: ITC Trademap

Productivity in ship and boat building



Source: State Statistical Service of Ukraine



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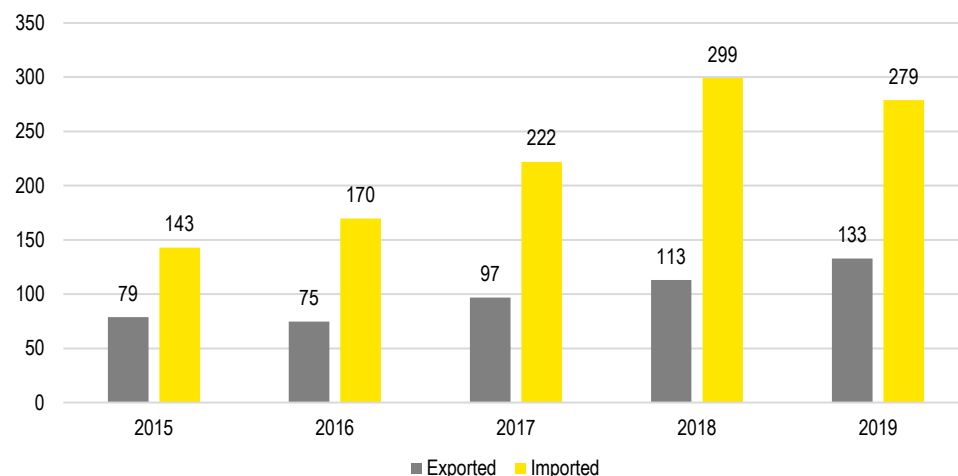
Engineering: metalworking machinery snapshot

Top companies in metalworking machinery industry in Ukraine

Company	Founded	FDI	Sales 2019, USD m	Sales, CAGR, 2014-2019	Personnel
Novokramatorsk machine building plant	1994	no	281.7	5%	8,908
Dniprovazhmash	2003	no	40.9	-12%	1,518
Kramatorsk plant of heavy machine building	1995	no	32.0	-33%	524
Magma	2002	no	19.7	19%	326
Dnipropetrovsk plant of rolling shafts	1995	no	13.8	0%	434

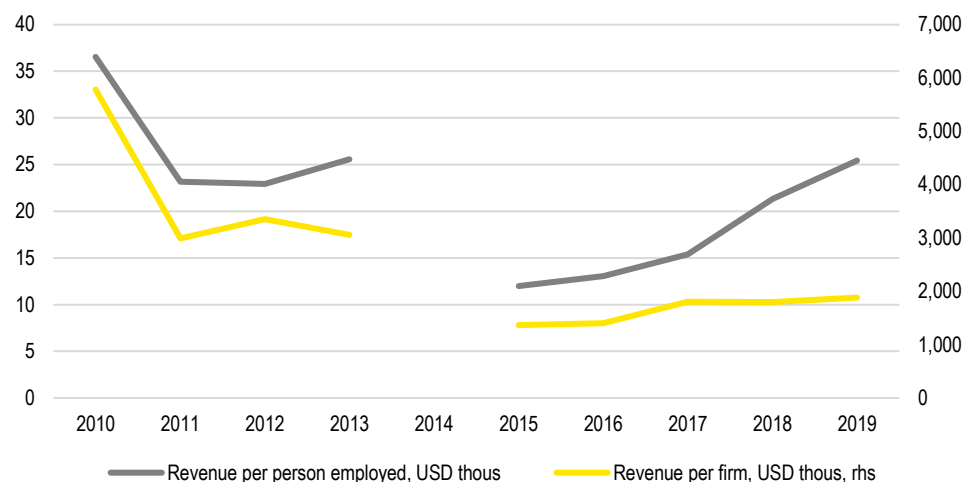
Source: YouControl

Foreign trade in metalworking machinery industry in Ukraine



Source: ITC Trademap

Productivity in metalworking machinery industry



Source: State Statistical Service of Ukraine

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ED None.

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