INDUSTRIAL POLICY FOR UKRAINE'S SURVIVAL

Reversing 30 Years of Deindustrialization

Brian Milakovsky | Volodymyr Vlasiuk

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The Ukrainian state must play an active role in addressing war-induced market failures and the cumulative impact of 30 years of deindustrialization. Western partners should abandon opposition to Ukrainian industrial policies such as localization.

To facilitate the continued growth and self-sufficiency of Ukraine's innovative arms manufacturing sector the Ukrainian government should allow regulated exports. Western donors should increase their purchase of Ukraine-made arms for the country's defense.

Ukraine and the European Union must co-invest in decarbonization of metallurgy and other key industries to ensure that Ukrainian manufacturing is not marginalized by the European Green Deal.

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EXECUTIVE SUMMARY

For more than a decade Ukraine has been in a struggle with the Russian Federation for its sovereignty and territorial integrity, and in February, 2022 this struggle became existential. Besides murderous attacks on civilians and a scorched-earth advance across eastern and southern Ukraine, Russia has also targeted economic infrastructure. Most recently Russian state television announced the goal of "de-electrifying" and "de-urbanizing" Ukraine, beginning with its second city Kharkiv, and devastating rocket attacks on power plants throughout the spring of 2024 demonstrate this was not an idle threat.

One reason that Ukraine is vulnerable to "de-electrification" or "de-urbanization" is that it entered this devastating war with an economy compromised by three decades of deindustrialization, which could only provide a fraction of the arms and tax revenues needed for the country's defense. This forced Ukraine into a dangerous reliance on external support from fickle Western democracies and on unsustainable levels of foreign debt accumulation.

And yet, as in so many other ways, Ukraine has shocked the world in its tenacity to correct course. It has stood up an extraordinary range of new arms production, including aerial and maritime drones that strike at the very guts of the Russian war machine and helped reopen Ukraine's Black Sea ports for international shipping. Ukrainian factories offer a master class in resilience, sometimes relocating production for the second time after Russia's invasion of the Donbas in 2014 all while cracking new Western markets.

This should inspire hope, but not complacency. Ukraine is in a profoundly dangerous position today, with Russia applying "military Keynesianism" to its much larger economy and spending more than 7% of its GDP on the military while Western assistance to Kyiv becomes increasingly unreliable. Ukraine needs crash re-industrialization, and for that it needs to throw off neoliberal dogma that has kept industrial policy out of the economic toolbox for nearly two decades. Kyiv should recognize that the state must play an active role in addressing war-induced market failures.

Some of Ukraine's leading policymakers have clearly turned that corner. Minister of Economy Iuliia Svyrydenko announced in January that, "in the context of aggression against Ukraine and in the needs of security and survival, industrial policy has acquired new importance. Today, its goal is to ensure a technological advantage over enemies and competitors.

The economic survival of Ukraine and Europe depends on the state of industry, its competitiveness and scale. And this goes far beyond the borders of the military-industrial complex."

The Minister is right to call for an industrial policy that is both Ukrainian and European. Kyiv needs financial resources from Brussels (and London, Washington, Ottawa, Tokyo and elsewhere), but also a common commitment to industrial modernization that will not leave Ukraine on the wayside of the European Green Deal. Indeed, without strategic co-investment in Ukrainian industry, the EU's decarbonization policies could deal a blow to the country's manufacturing exports second only to Russia's destruction.

And Brussels also needs to loosen the constraints of its free trade and EU candidacy agreements with Ukraine to allow Ukraine to practice localization and targeted assistance to war-devastated industries. This would be a break from the EU's opposition to pre-invasion policies like the 2017 roundwood export ban or 2020 Localization law. As Ukraine accumulates more and more debt to fund its defense and reconstruction, all its partners must recognize the imperative to spend as much of that loaned money as possible on Ukraine's own industrial goods, rather than view the funds as a source for stimulus in their own economies. Only in that way can Ukraine restart the virtuous circle of production and taxation that will allow it to gradually restore self-sufficiency and pay down its debts.

For Minister Svyrydenko is also right to use the word "survival" when discussing her country's industrial policy. Not only prosperity and development, but survival as a state. These are the true stakes for Ukraine in crafting a new industrial policy.

PART I: DEINDUSTRIALIZATION AND INDUSTRIAL POLICY IN UKRAINE, 1991-2021

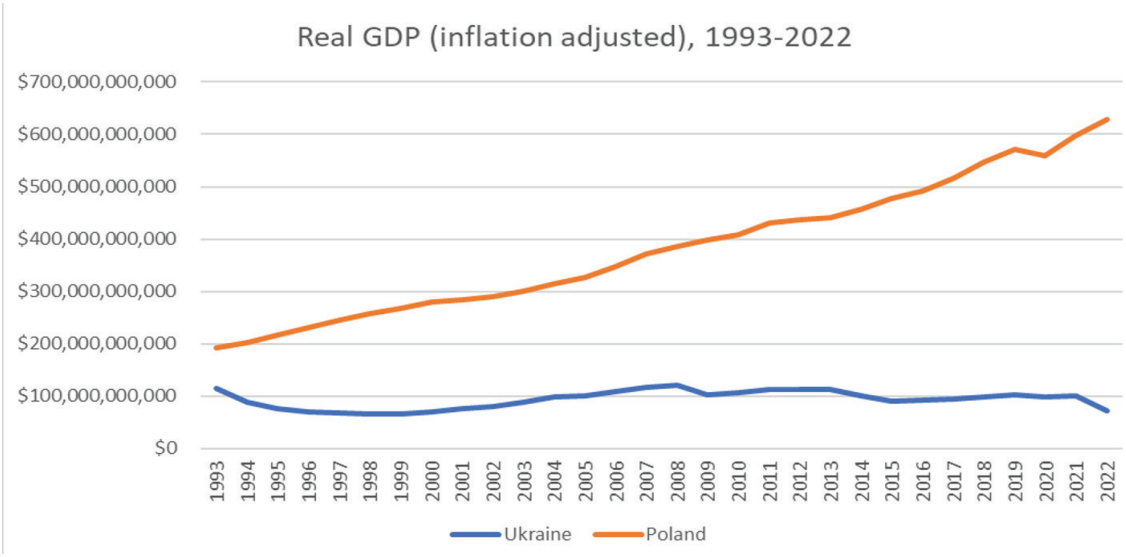
Ukraine gained independence in 1991 with one of the largest industrial sectors in eastern Europe, both in real terms and in its proportion of gross domestic product (GDP). But the enormous shock from the end of state financing and central planning and the severing of value chains triggered an immediate plunge in production, such that by 1998 Ukrainian industry was producing just 30% of the value added it did in 1991.[1] Unsurprisingly, GDP followed this same trend.

When the industrial index finally returned to positive figures in 1999, Ukraine began a tortuous 25 year process of gradual recovery towards the 1991 level of GDP and industrial production, which took on a sawtooth form as period geopolitical and economic shocks knocked that recovery back, only to rise again to the next shock. Chronologically, these included the 2008 global crisis, punitive Russian tariffs on industry in 2011, Russia's 2014 invasion of Crimea and the Donbas, COVID-19 and Russia's full scale invasion in 2022 (Fig. 3). Through this turbulent period Ukraine lacked the ideological framework to counter these shocks with systemic industrial policy, practicing it only on a limited and ad hoc basis.

At the same time, Ukraine's neighbors across the political spectrum from Western-oriented new EU members to autocratic Russia and Belarus all practiced industrial policy to correct the growth pains of post-socialist development. For example Poland's GDP grew by more than 3 times in inflation adjusted terms from 1991 to 2020, and industry's contribution to that growth held at a steady 15-20% even as other sectors like services, finance and IT emerged and grew exponentially (Fig. 1-2).

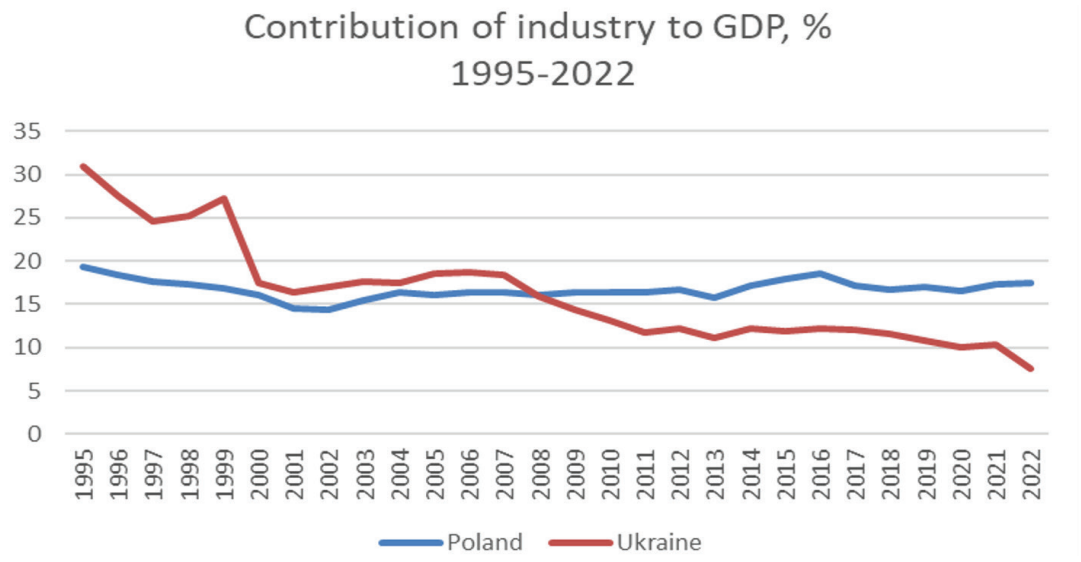
Ukrainian industry, by contrast, contributed a constantly diminishing proportion of Ukraine's disappointing GDP (Fig. 1-2). This is one of the grimmest and most sustained cases of deindustrialization in the modern world.

Figure 1.
GDP adjusted for inflation in Ukraine and Poland, 1993-2022. Data source: Worldometers.info



1 Derived from data from the State Statistical Agency of Ukraine, https://www.ukrstat.gov.ua/

Figure 2.
Contribution of industry to GDP generation in Ukraine and Poland, 1995-2022. Data source: Worldometers.info

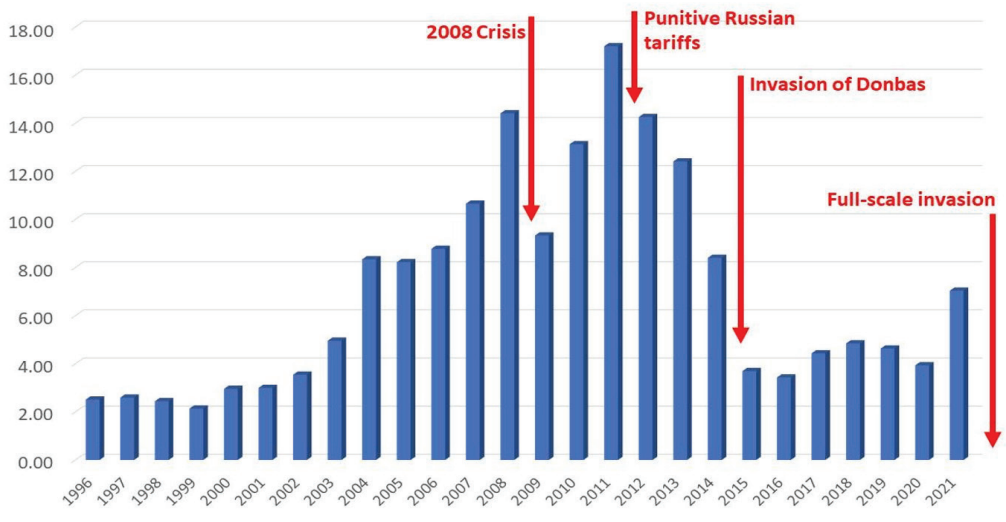


The period 2000-2008 offered the calmest and most suitable conditions for industrial recovery in Ukraine's years of independence. International markets for metals and chemicals were strong and prices low for natural gas from Russia, which remained Ukraine's largest supplier. Foreign banks expanded loan programs to developing economies like Ukraine, facilitating a dramatic increase in availability of credit financing.[2] This period saw the birth of many small and mid-sized manufacturers independent of legacy Soviet enterprises, which in time would prove to be vitally important for the diversity and resilience of the industrial sector.

It also saw an early and abortive attempt at industrial policy to reinforce these favorable market conditions. Ukraine established 11 Special Economic Zones (SEZs) (see insert "Mixed experience with state support for industry") that brought some local manufacturing growth to depressed communities but also was abused for tax evading purposes, especially in the industrial heartland of Donetsk.

When the Orange Revolution brought to power the Western-oriented and reform-minded president Viktor Yuschenko and prime minister Yuliia Tymoshenko,

Figure 3.
Exports of industrial products from Donetsk Oblast, 1996-2021, with major external shocks demonstrated by red arrows. Derived from data from the Donetsk Oblast Statistical Department



2 Pekka Sutela. 2012. The Underachiever: Ukraine's Economy Since 1991. Carnegie Endowment for International Peace

the SEZ program was scrapped as a vestige of alleged crony capitalism under former president Leonid Kuchma. This experience demonstrated the political calculus that would work against industrial policy for the next two decades: perception of its capture by oligarchic interests and its incompatibility with an agenda of free trade and reduced state participation in the economy promoted by Western advisors and reinforced by Ukraine's entry into the World Trade Organizations (WTO). Ukraine dramatically opened up its economy without developing most of the tools needed to ensure its enterprises could take advantage of market access abroad, such as export financing.[3]

industrial commodities that had boomed in the early 2000s. It also was the beginning of the end for many remaining value-added sectors that had not sufficiently modernized. For example, car, bus and tractor production suffered production declines of 98%, 90% and 77% respectively between 2007 and 2021.[4]

Ukraine's economy began limping towards recovery in 2010, albeit with a further diminished industrial sector (Fig. 2). During this period Russia expanded its role in Ukrainian industry. Russian holdings purchased key industrial assets, often shuttering them to the

Mixed experience with state support for industry

Ukraine practiced at best limited and ad hoc industrial policy throughout the turbulent 2000s and 2010s. Perhaps the brightest spot in a general atmosphere of industrial drift was Ukraine's use of high export duties (23%) on the export of raw sunflower seeds, one of the country's key agricultural commodities. This duty was gradually lowered and by 2008 Ukraine's entry into the WTO necessitated setting it at 10%. But by then it was no longer really needed; oil pressing capacity in Ukraine had grown by more than 5 times and the country became the world's leading sunflower oil exporter.[5]

But more systemic approaches to industrial development did not produce such clear benefits. In 1999 Ukraine established 11 special economic zones (SEZ) across the country that offered tax and import duty rebates and easy access to government services as incentives to foreign and domestic investors. There were locally successful SEZs in underdeveloped regions like Zakarpattia, Mykolayiv and Rivne, but the central and local governments failed to make many of the investments in infrastructure that would have attracted more investors, leading to disappointing results at a national level.[6] Even worse, some of the zones were used for dodging taxes by existing companies or importing duty-free consumer goods, earning one the moniker "Donetsk Offshore Zone".[7]

Similarly, in 1999 Ukraine tried to draw on the successful experience of its neighbors by permitting establishment of industrial parks (referred to then as "technological parks"). From that moment began a cycle of discrediting and rehabilitation of the concept, and its frequent re-legislating (2012, 2015 and now 2021-2024) as dozens of industrial parks languished on paper for the next two decades without spurring manufacturing growth. The primary issue is that until the latest round of legislation, industrial parks in Ukraine worked on the principle of "if you build it they will come" (sometimes without even a physical structure, being just a certain spot on the map) without the diverse regulatory, tax and customs incentives offered in other countries. By 2022 only 10 industrial parks out of 70 registered actually functioned, and only two were fully occupied.[8] As described below in the insert "Made in Ukraine: Wartime support for manufacturing" Kyiv is presently working diligently to bring industrial parks to life as part of its re-industrialization strategy.

A different example of industrial policy, or rather state aid, did much to undermine the concept further in Ukraine. Between 2004 and 2013 the country's increasingly unprofitable coal mining industry consumed $12.4 billion in subsidies. This likely helped prevent a socioeconomic catastrophe in depressed mining towns of the Donbas and western Ukrainian coal basins (as was observed after harsh market-driven "optimization" of the mining sector in the Russian portion of the Donbas during this period) and helped Ukraine maintain an element of energy independence. But it also fed grotesque corruption and patronage politics that turned many Ukrainians away from the idea of targeted state support for industry.

At the same time, Russia successfully pushed forward with industrial policies such as SEZs that attracted significant foreign direct investment to the country, boosting the industrial economy that would eventually be turned against Ukraine.

The 2008 global economic crisis ended this oasis of recovery, pounding Ukraine's economy perhaps as hard as any in the world. The financial sector dried up and the crisis revealed Ukraine's over-reliance on low-value-added

3 Interest rates of 18% were typical for much of the post-2008 period for trade financing, and in fact no state export financing program operated regularly

4 Citation? Car production in 2007 was approximately 380,000 units, and in 2021 was 8100. Bus production in 2007 was 9100 units, and in 2021 was 900. Tractor production was 5200 units in 2007 and 1200 in 2021.

5 Volodymyr Vlasiuk et al. 2022. "Manufacturing Industry: Employment, Economic Growth and a Capable State." Presentation to Verkhovna Rada Economic Development Committee. https://komprompol.rada.gov.ua/news/main_news/74547.html

6 Y.P. Maidanevich and V.V. Kasyanchik. 2012. Free (special) economic zones of Ukraine. In Culture of the peoples of the Black Sea Region (in Russian)

7 V.V. Zinchenko. 2010. The dilemma of special economic zones in Ukraine: subsidized regionalism or systemic deregulatory tribalism? In Problems of the Modern Economy 4 (2010): 241-244 (in Russian)

8 Telegram channel of Danylo Hetmantsev, head of Verkhovna Rada Committee on Fiscal, Tax and Customs Policy. April 2, 2024. https://web.telegram.org/a/#-1001344328240

frustration of workers and policymakers,[9] and in 2008 Russia became the largest importer of Ukrainian manufactured goods for the first time. This growing importance allowed Russia to strike hard when Ukrainian president Viktor Yanukovich began serious negotiations with the European Union in 2011 about his country's candidacy.

Moscow slapped punitive tariffs on a variety of important Ukrainian industrial exports, reinforcing a policy of import substitution to reduce its reliance on products from geopolitically "unreliable" Ukraine.[10] This hit eastern oblasts of Ukraine hardest of all, given their heightened orientation on the Russian market. In Donetsk Oblast exports fell by 27% between 2011 and 2013 with no end in sight (Fig. 3). The tariffs and other trade barriers particularly ravaged the railcar manufacturing sector, one of Ukraine's last outposts in machine building, which produced 0.5% of the country's GDP.[11]

Yanukovich was faced simultaneously with this economic coercion and the promise of cheap loans from Russia if he would abandon the EU path. When he did so it triggered the fateful Euromaidan protests of 2013. The movement vanquished, a new government emerged in Kyiv and Russia launched an ill-concealed invasion of Ukraine's industrial heartland, the Donbas. The crisis of Ukrainian industry entered a new phase.

RUSSIA'S FIRST WAR AND INDUSTRIAL POLICY

Russia's 2014 invasion caused massive market failures. Factories, mines and power plants were damaged across the Luhansk and Donetsk regions and hundreds of thousands of workers were displaced, causing a sharp reduction in output. Russia intensified its sanctions against Ukraine, costing the latter $400 million a month in unrealized exports.[12] By 2015, Donetsk and Luhansk Oblasts' gross regional product (reflecting both the government-controlled and Russian-occupied sides of the frontline) was just 39% of the 2013 level – representing a loss of approximately $5.5 billion.[13]

Ukrainian-owned coal mines, steel mills and factories were able to maintain some production even in the Russia-controlled "Luhansk and Donetsk Peoples Republics" until 2017, but they were then "nationalized" and shorn of access to world markets. At this moment earlier Russian promises of a Donbas renaissance were proven hollow as it was revealed that the region's enterprises were redundant with Russia's own heavy industry. They became a black-market source of laundered, low-value products under the control of Kremlin-linked oligarchs. Production and wages fell constantly and many enterprises were simply cut into scrap metal. By 2020 this led to an unprecedented wave of mining and factory strikes, an extraordinary measure in an occupied police statelet.

On the Ukraine-controlled side of the frontline, post-Maidan leadership under President Petro Poroshenko was ideologically disinclined to address wartime market failures with state intervention. This was reinforced by the Western-supported reform agenda, which sought to reduce the role of the state in the economy through privatization, limit opportunities for oligarchic rent-seeking and enhance competition and economic openness through public procurement reform. The tough conditions of debt financing from the International Monetary Fund, Ukraine's signatory status to the WTO Agreement on Government Procurement and the EU-Ukraine Deep and Comprehensive Free Trade Agreement (DCFTA) further narrowed the horizons for industrial policy that could favor beleaguered domestic manufacturers.

Poroshenko did oversee the reform of the state defense industry holding, during which it became profitable for the first time since its establishment in 2010. "Ukroboronprom" began to significantly contribute to Ukraine's war effort, though it was also plagued by corruption scandals that sullied its own reputation and that of state enterprises in general.

After the initial production plunge of 2014 Ukraine's wartime economy up to 2021 was stabilized, though stagnant and underperforming. Manufacturing's contribution to GDP continued to decline (Fig. 2) relative to other sectors. There were success stories of market expansion, often from the new generation of smaller, more flexible enterprises that emerged in the 2000s, but the economic sophistication of Ukraine's "export basket" to the European Union actually declined from 2008-2021 despite overall trade increasing under the DCFTA (the proportion of manufactured goods feel from around 60% to around 50%). The sophistication of Ukrainian machine building exports particularly declined such that by 2021 almost half were just individual parts used in auto manufacturing in neighboring EU countries.[14]

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9 Examples include the Zaporizhzhia Aluminum Plant, purchased in 2004 by the Rusal Corporation, the Odesa Oil Refinery, purchased by Lukoil in 2000 and the Lysychansk Oil Refinery, purchased by TNK in 2000.

10 https://www.bbc.com/ukrainian/ukraine_in_russian/2013/08/130815_ru_s_customs_ukraine_russia

11 Samofalova O. 2013. "Downhill." Vzglyad. (in Russian) https://vz.ru/economy/2013/10/29/657266.html

12 Matthieu Crozet & Julian Hinz, "Collateral Damage: The Impact of the Russia Sanctions on Sanctioning Countries' Exports," CEPII Working Paper, June 2016. http://www.cepii.fr/PDF_PUB/wp/2016/wp2016-16.pdf

13 Andrii Kolosov, "Economic blockade of enterprises in the uncontrolled part of the Donbas bears its negative consequences", (In Ukrainian), Economic Herald of the Donbas, No.3 (49), 2017.

14 Ihor Huzhva and Yevhen Ivanov. 2021. Deepening the Strategic Orientation: Trade relations of Ukraine and European Union countries in the context of the Association Agreement. (In Ukrainian) Federation of Employers of Ukraine. Financed by Ministry of Foreign Affairs of Denmark

It was precisely in light of these disappointing results of EU-Ukraine free trade that Ukraine's parliament began experimentation with industrial policy. In 2017 the Verkhovna Rada imposed a ban on the export of unprocessed roundwood, fearing that the country's forest resources were contributing more to the economic development of neighboring Poland or Romania than to Ukraine's rural north and west. The EU objected that this was an unfair trade restriction under the DCFTA and eventually took its complaint to the WTO, where a ruling against Ukraine is likely. But in the time that EU claims were being considered, investment in wood processing in Ukraine grew by 88.5%. Skeptics worried that this investment would just go to basic processing into boards, but by 2020 value-added furniture production had grown by 1.5 times.[15]

In the same year the Verkhovna Rada introduced a 25% rebate program for farmers who purchased Ukrainian-made agricultural equipment. This helped shift the cost/benefit calculation of buying local for more than 10,000 farmers, and led to a doubling of both production and the share of domestic equipment on the market (from 16.8 to 33.0%).[16] This successful policy gave many factories in the declining sector a new lease on life, and perhaps enough resources to begin the long process of catching up technologically with foreign competitors.

In 2020, already during the presidency of Volodymyr Zelensky, the Rada looked to add local content mandates to the toolbox for supporting Ukraine's long-suffering machine building sector. The Localization Law imposes a gradually rising minimum of Ukrainian-made components in vehicles procured by all levels of government. But a last-minute, high-level intervention by the head of the EU Mission in Ukraine secured an exemption for EU companies which drastically reduced the law's potential impact. Nonetheless, its designers believe that even in this abridged form the law helped preserve thousands of jobs in Ukraine through its application to vehicles from Chinese, Turkish and other foreign producers.[17]

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15 Vlasiuk et al. 2022

16 Ibid

17 Interview with Verkhovna Rada MP Dmytro Kysylevskiy, April 2024

PART II: INDUSTRIAL POLICY AND UKRAINE'S SURVIVAL, 2022-2024

The future international tribunal on Russia's crimes against humanity will focus on the murderous bombardment of cities and villages, filtration and execution of civilians and abduction of children, but its economic crimes should also be considered.

From the first days of the invasion Russia set to work bombing into rubble one of Ukraine's most vibrant cities and industrial GDP engines, Mariupol. The destruction of the Azovstal and Ilyich steelworks there removed 40% of Ukraine's metallurgy output in just a few months. Entire sectors disappeared under Russian bombardment, such as Ukraine's salt mines and gypsum factories in Bakhmut and Soledar. The list can go on and on, from Chernihiv to Mykolayiv, everywhere that Russia could "liberate" Ukrainians from their livelihoods and future.

From its underperforming 2021 level industrial production fell by more than a third, similarly to GDP overall, and production of metals, building materials and chemicals fell by more than 60%.[18] The contribution of manufacturing to GDP reached its shocking all-time minimum in Ukraine of 7% (Figure 1).

Millions of Ukrainians fled abroad and hundreds of thousands entered the armed forces, making availability of skilled labor one of the most serious barriers to recovery.[19] Hundreds of industrial enterprises evacuated from the warzone to central and western Ukraine, often providing inspirational examples of resilience.[20] But in the first six months of the war alone more than 3.6 thousand companies with Ukrainian origin were registered in Poland, at least some of which surely brought their production with them.[21]

The Russian occupation of Ukraine's Azov Sea ports and blockade and bombardment of its Black Sea ports made ore and metallurgy exports nearly impossible, a crisis resolved only by Ukraine's remarkable use of rockets and domestically produced maritime drones to drive the Russian Black Sea fleet out of the western shipping corridor.

Russian attacks on electricity production undermined industrial output from the start of the war, but the issue became chronic by the spring of 2024 as Russia rained rockets down on power plants unprotected by Western air defense. Rationing of electricity began in some regions both for residents and factories, and the head of Ukraine's energy utility called on enterprises to consider installing autonomous energy production from solar panels or gas turbines.[22]

As we can see, the challenges for Ukrainian industry are massive. But it is clear that one key barrier to its recovery has already crumbled: ideological opposition to industrial policy.

In 2022 President Zelensky called for a "rethinking of how our country will develop in the future… What solutions and resources are needed to increase the level of manufacturing in Ukraine and not to trade raw materials, as it was before."[23] At the Ukraine Recovery Conference in 2023 finance minister Serhiy Marchenko called for a development strategy that uses all available policy measures to rebuild national industry. Minister of Economy Yuliia Svyrydenko has said that support for manufacturing is a matter of "national economic survival" and should become "Ukraine's new economic philosophy."[24]

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18 Yuriy Grigorenko. 2022. Industrial production in Ukraine decreased by 37% in 2022. GMK Center. https://gmk.center/en/infographic/industrial-production-in-ukraine-decreased-by-37-in-2022/

19 Industrial sector of Ukraine in wartime. 2022. Presentation by Federation of Ukrainian Employers, grcUA and EU4Skills.

20 A remarkable example is the UTerm company, a producer of steel radiators that first relocated in 2014 from the Russia-occupied city Krasniy Luch in the Luhansk region to Chuhuyiv in the Kharkiv region, and then again relocated away from Russian rocket attacks in 2022 to Bila Tserkva in the Kyiv region, where it has resumed export-oriented production.

21 Poland: Registrations of Ukrainian companies 2022 | Statista. https://www.statista.com/statistics/1358818/poland-registrations-of-ukrainian-companies/#statisticContainer

22 Myroslav Hurko. 2024. Ukrenergo called on companies to produce their own energy independently. Focus. https://focus.ua/uk/economics/639346-v-ukrenergo-zaklikali-promislovist-zabezpechuvati-sebe-elektroenergiyeyu-samostiyno

23 Office of the President of Ukraine. 2022. We, the world and history will take from Russia much more than Russian missiles will take from Ukraine - address by President Volodymyr Zelenskyy. https://www.president.gov.ua/en/news/mi-svit-ta-istoriya-zaberut-u-rosiyi-znachno-bilshe-nizh-ros-74409

24 Olena Sereda. 2023. Svyrydenko: Support for manufacturing should become the new economic philosophy of Ukraine. Dzerkalo Tizhnya (in Ukrainian). https://zn.ua/ukr/ECONOMICS/pidtrimka-pererobnoji-promislovosti-maje-stati-novoju-ekonomichnoju-filosofijeju-ukrajini-sviridenko.html

The next sections of this white paper will explore how Ukraine and its Western partners can act on these bold pronouncements.

THE ENTREPRENEURIAL WAR ECONOMY

Russia has adopted a model of "Military Keynesianism"[25] to concentrate its industrial economy on building an arsenal of aggression. Ukraine's remarkable defense production surge over the past two years has followed a very different path, one that combines cautious experimentation with industrial policy with the entrepreneurial dynamism of Ukrainian civil society.

Ukraine's war effort is still highly dependent on Western arms transfers, as was evident in the nerve-wracking six months that Ukrainians waited for the US Congress to approve new military support while shells and air defense rockets dwindled. But the conditions are in place for a dramatic growth in self-sufficiency. According to Ukraine's prime minister Denys Shmyhal, defense production in Ukraine increased by three times in 2023 and could grow by six times in 2024.[26] A particular success story has been the mass production of drones that the Ukrainian Armed Forces (UAF) used to compensate for idled artillery and hold off Russian "meat storms".

Ukraine's drone industry has its roots in a huge grassroots fundraising and distribution effort to first import and then begin producing hundreds of thousands of civilian drones for enemy surveillance, correction of artillery targeting and jury-rigging into kamikadze weapons. These volunteer networks became such serious purchasers that they were able to influence product design and helped accelerate localization of the value chain.

In contrast to the all-encompassing centralization of Russia's war economy, the Ukrainian government chose to leave this highly decentralized production model intact and not try to bring it under the control of the Ministry of Strategic Industries. This has multiple advantages[27]:

- Numerous locations reduce the risk of the Russian rocket attacks taking out production
- Activist fundraising networks remain intact to supplement the state's limited budget for drone purchases
- Dynamic private sector and activists engineers innovate at a pace that keeps up with the enemy's own adaptations to Ukrainian drone warfare

State defense plants are also producing drones, but under the Ukrainian model nine out of ten long-range drone manufacturers are private players.[28] Minister of Digital Transformation Mykhailo Fedorov, who curates this unusual model, claims that Ukraine can meet 90% of its drone production needs, including long-distance and maritime drones.[29] But to this statement must be added the caveat "if there will be funding…"

The same rapid growth with large private sector involvement is visible in the wider defense sector, and the same funding constraint as well. Across the sector the number of manufacturers has grown by two times since the start of the full scale invasion, and private firms outnumber state-owned by 4:1 (the large size of state factories means that they still hold the majority of production capacity, however).[30] As with drones, this helps prevent excessive concentration of production in large, vulnerable factories such as the Malyshev Tank Works in Kharkiv, which has twice come under massive Russian rocket attacks. Some plants move production as often as three times a year to elude the Russians, incurring significant costs.

But by the admission of Ukraine's Minister of Strategic Industries Oleksandr Kamyshin, the production capability of the domestic defense industry (around $20 billion of goods) far exceeds the purchasing power of the state budget ($6 billion in 2024 for arms purchases).[31] Many of the private firms that emerged to meet state demand complain that irregular and uncertain contracting puts their business at risk. "Arms production today is practically a seasonal business" according to Kateryna Mykhalko, CEO of the defense tech association Technological Forces of Ukraine.[32] "That's a catastrophe for the private sector. In order for manufacturers to exist and compensate their team, they need working capital."[33] One source suggests

25 Ishchenko, Volodymyr, Ilya Matveev and Oleg Zhuravlev. 2023. Russian Military Keynesianism: Who Benefits from the War in Ukraine? PONARS Policy Memo No. 865

26 David L. Stern. 2024. Ukraine races to build weapons at home. Washington Post. https://www.washingtonpost.com/world/2024/03/20/ukraine-weapons-industry-domestic-production/

27 Taras Fedirko, Maryna Yakovenko, Daria Chernousova, Stephanie Diepeveen, Matti Pohjonen, Adam Quinn, Theo Tindall, Florian Weigand. 2024. Deciphering drones: the organisation of innovation in Ukraine's war economy. Research report. London: ODI and LSE Ideas

28 Halyna Yanchenko. 2024. Defense Technology Investment in Ukraine Is Attractive but Awaits Greater Risk Insurance. Focus Ukraine. Wilson Center. https://www.wilsoncenter.org/blog-post/defense-technology-investment-ukraine-attractive-awaits-greater-risk-insurance

29 Stern 2024.

30 Max Hunder. 2024.Ukraine's growing arms sector thwarted by cash shortages and attacks. Reuters. https://www.reuters.com/world/europe/ukraines-growing-arms-sector-thwarted-by-cash-shortages-attacks-2024-04-19/

31 Elsa Note. 2024. Minister: Denmark first to buy military aid for Ukraine from Ukrainian manufacturer. The Kyiv Independent. https://kyivindependent.com/denmark-first-to-buy-weapons-for-ukraine-from-ukrainian-manufacturer-in-deal-worth-28-5-million/

32 Bohdan Miroshnychenko. 2024. "The hen must be fed." Can Ukraine open exports for arms manufacturers? Ekonomichna Pravda (in Ukrainian) https://www.epravda.com.ua/publications/2024/03/8/710903/

33 "The Technological Forces of Ukraine association named the problems facing Ukrainian arms manufacturers." 2024. Espreso (in Ukrainian). https://espreso.tv/suspilstvo-v-obednanni-tekhnologichni-sili-ukraini-nazvali-problemi-ukrainskikh-virobnikiv-zbroi

that in the first months of 2024 Ukraine's largest drone factories were engaged at only 5-15% of their full capacity as they waited for large tenders promised by the state.[34]

Anatoliy Khrapchinskiy, an aviation expert and advisor to the director of a defense enterprise, said that private companies like his employer have had to take on complex research and development (R&D) at their own expense. "We've spent two years developing a new air defense system against unmanned aerial vehicles. Everyone comes by and says 'send them over when they're ready' but if they provided funding at this stage we'd already have a trial model."

But where can the Ukrainian state find funding for regular orders, let alone R&D support? The Ministry of Digital Transformation supports private drone producers where it can with development grants, which grew by 10 times to $37 million in 2024[35] and parliament plans to establish a subsidized loan program for drone and other defense enterprises to compensate for the difficulty of finding private capital during wartime.[36] No one expects that these measures can really bridge the funding gap, though. For that to happen policy solutions are necessary: arms manufacturers either must gain access to currently prohibited export markets, or international donors must begin purchasing more arms inside Ukraine.

Both policies are politically fraught. Ukrainian arms manufacturers claim that allowing licensed exports of products not presently in deficit for the UAF would help them survive between government contracts, grow the industry faster and bring in more jobs and revenues for Ukraine's economy.

Minister of Strategic Industries Kamyshin has stated that while such calls are "fair," they lack political support. He likely fears the impression that exports would have on Western publics that are constantly (and accurately) told that Ukraine is in urgent need of more arms.[37] Instead, the minister launched a "global fundraising campaign, a strategic crowdfunding - not by people, but by entire nations" to secure $10 billion in funding commitments from partners to buy Ukrainian arms for Ukraine. The first donations to this initiative were modest: $28.5 million from the Danish government[38] and $2.1 million from the Canadians.[39]

The obvious challenge to scaling up the Zbroyari ("Gunsmith") initiative is that buying arms from their own manufacturers has been one of the main selling points for Western governments trying to convince their publics that military aid to Ukraine is not a burden but a boon. This argument has been particularly important in overcoming opposition in the United States. So the announcement of the third donation to Ukraine's initiative is all the more remarkable: a $2 billion Foreign Military Financing for Ukraine fund with US financing to purchase arms from non-US sources, including domestic ones. The fund should "facilitate co-production between Ukrainian and U.S. industry and help support Ukraine's defense industrial base to strengthen Ukraine's capacity to produce weapons to defend itself."[40]

The US announcement suggests that donors can play a significant role in Ukraine's defense industrial policy to avoid battlefield collapse when Western direct aid ebbs, or debilitating debt from exclusive reliance on imported arms. It is a major step towards regarding Ukraine as something other than just a worthy aid recipient. But the impressive figure of $2 billion still covers just a portion of Ukraine's funding needs, and Ukraine's arms manufacturers need both export revenue and more Western co-investment to reach their potential.

The inclusion of Ukraine in the EU's European Defence Industrial Strategy (EDIS) could help determine whether military support for Ukraine becomes an economic driver within the country. The EDIS proposes that Ukrainian industry be able to participate in the EU's defense support programme. Ukraine will have the opportunity to participate in joint procurement, and Ukrainian defense companies will be supported in building capacity and cooperation with the European industry. It further mentions a "separate budget line to support Ukraine's defense industry and defense companies" which might be financed with proceeds from frozen Russian sovereign assets, pending a decision of the EU Council.[41]

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34 "The largest Ukrainian manufacturers of drones almost did not receive contracts, are working at only 5-15%." Defense Express. February 26, 2024. https://defence-ua.com/people_and_company/najbilshi_ukrajinski_virobniki_droniv_dosi_ne_otrimali_kontrakti_zavantazhennja_lishe_na_5_15-14569.html

35 Bohdan Miroshnychenko. 2024. Brave1 increased grants for military design by 12 times. How does the main techno-cluster of the Ukrainian army work? Ekonomichna Pravda (in Ukrainian). https://www.epravda.com.ua/publications/2024/05/7/713353/

36 Telegram channel of Verkhova Rada parliamentarian Musa Magomedov. https://t.me/magomedov_mus/2533

37 Miroshnychenko 2024

38 Ministry of Strategic Industries of Ukraine. 2024. ZBROYARI project: Denmark becomes the first country to purchase Ukrainian weapons for the Armed Forces at its own expense. https://mspu.gov.ua/en/news/zbroyari-project-denmark-becomes-the-first-country-to-purchase-ukrainian-weapons-for-the-armed-forces-at-its-own-expense

39 Orysia Hrudka. 2024. Canada becomes the second country to commit to funding Ukrainian weapons production. Euromaidan Press. https://euromaidanpress.com/2024/04/27/canada-becomes-the-second-country-to-commit-to-funding-ukrainian-weapons-production/

40 Bryant Harris. 2024. US announces $2 billion to help Ukraine make its own weapons. Defense News. https://bit.ly/3WW6u7m

41 Ministry for Strategic Industries of Ukraine. 2024. Ukraine becomes part of the European Defence Industrial Strategy https://bit.ly/3WPCRo9.

For the time being, the EDIS is aspirational. Ukraine is farther along in securing specific joint defense production deals with Western partners, although so far the country has been more of a "donor" in this regard, sending battle-tested technology and experts to EU defense plants to boost production without risk of Russian rockets.[42] But the list of seemingly on-the-rails projects inside Ukraine is impressive, including a new plant for 155 mm shells with 51% ownership by the German Rheinmetall holding,[43] two ventures with American firms to produce 155 mm shells that could come online in 2026,[44] a factory for production of Turkish Bayraktar drones that is already under construction,[45] broad agreement with the UK to localize maintenance, repair and production of arms in Ukraine and joint Ukrainian-Slovak howitzer production at a machine building plant in Kramatorsk.[46]

Ukraine must ensure that these commitments come to ground and accelerate modernization in its defense sector. According to defense sector advisor Anatoliy Khrapchinsky, western companies are hungry for the "battlefield R&D" of Ukraine's drone sector, which they would have had to spend billions on in controlled conditions, but the right platform for knowledge sharing doesn't exist yet. Male defense engineers can only leave the country with great difficulty during wartime, and Ukraine lacks a secure and well-equipped "innovation campus" for joint R&D. US companies may not be comfortable investing in fabrication laboratories or plants in Ukraine without investment risk insurance such as that provided on an experimental basis by IFIs to non-defense sectors.[47]

Another condition for increased Western investment might be continued reform of corporate governance in Ukraine's state defense holding Ukroboronprom, with its history of scandal. The US in particular is pushing for even more transparency in management, senior hiring and procurement.[48] Internationalized oversight boards were introduced to state enterprises at Western urging after 2014, and there is an active debate in Ukrainian expert circles about their efficacy, but at the least Kyiv will need to take these signals from Western partners seriously. If it does not, Ukraine risks being offered a different model, one outlined in a recent paper by the Carnegie Endowment for International Peace: concentrate joint arms production outside of Ukraine in the European Union where corporate governance is stronger and security more assured. Ukrainian workers already in labor migration can be engaged in these plants. How and whether this production would eventually migrate to Ukraine to generate GDP there is left unclear.[49]

THE CIVILIAN ECONOMY: A NEW PUSH FOR LOCALIZATION

As described above, Ukraine's defense needs stimulated huge demand in the arms sector, to which domestic manufacturers responded with greatly increased production. But many manufacturing sectors in the civilian economy are still waiting for such a stimulus after the cratering of consumer demand in 2022.

A review of public tenders on the platform ProZorro revealed that state purchasing of certain non-weaponry goods grew sharply from 2021 to 2023. These include medicine and medical equipment, for which state purchasing rose from $70.5 million in 2021 to $153 million in 2023, uniforms ($4.7 million to $96 million), food products to feed UAF troops ($9.4 to $793 million), and building materials for renovation of damaged buildings, not including road building materials ($154 to $721 million).[50]

But these increases only partially compensate for lost consumer demand, and other public statistics indicate that import of all these products except for medicine rose during the same period. As a result, the role of Ukrainian-made goods in meeting overall demand fell despite increased public purchasing. For instance, the proportion of imports in Ukraine's building materials sector rose from 14% before the invasion to nearly 1⁄4 in 2023, and for food products from 1⁄4 to more than 1⁄3. This occurs at a time when the most common barrier for business recovery cited by Ukrainian manufacturers is lack of demand.[51]

The Ukrainian government is talking up domestic manufacturing as never before, and has launched

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42 Kateryna Stepanenko, George Barros, and Fredrick W. Kagan with Grace Mappes, Nicole Wolkov, Angelica Evans, and Christina Harward. 2024. Ukraine's Long-Term Path to Success: Jumpstarting a Self- Sufficient Defense Industrial Base with US and EU Support. Institute for the Study of War & AEI's Critical Threats Project 2024.

43 Press release: Joint venture with Ukrainian partner: Rheinmetall to produce artillery ammunition in Ukraine. February 19, 2024. https://www.rheinmetall.com/en/media/news-watch/news/2024/02/2024-02-19-joint-venture-in-the-ukraine

44 Reuters. 2023. Ukraine to make shells with US firms as it seeks to develop defence sector. https://www.reuters.com/business/aerospace-defense/turkeys-drone-maker-baykar-begins-build-plant-ukraine-2024-02-06/

45 Pesha Magid. 2024. Turkey's drone maker Baykar begins to build plant in Ukraine. Reuters. https://www.reuters.com/business/aerospace-defense/turkeys-drone-maker-baykar-begins-build-plant-ukraine-2024-02-06/

46 Stepanenko et al. 2024

47 Yanchenko 2024

48 Kateryna Bondar. 2023. Arsenal of Democracy: Integrating Ukraine Into the West's Defense Industrial Base. Carnegie Endowment for International Peace. https://bit.ly/44XvahO

49 Bondar 2023

50 Unpublished analysis by Volodymyr Vlasiuk for the PeaceRep program at the London School of Economics and Political Science. Publication anticipated in 2024

51 Viktor Holoborodko. 2024. Ukraine's industrial businesses identified the main problem that constrains production. Dzerkalo tizhnya (in Ukrainian), May 1, 2024. https://zn.ua/ukr/ECONOMICS/promislovij-biznes-ukrajini-viznachiv-osnovnu-problemu-shcho-strimuje-virobnitstvo.html

Made in Ukraine: Wartime support for manufacturing

Kyiv is strategically using what modest budget resources are available for business support in wartime (around $1 billion) to boost manufacturing in a program called Made in Ukraine. Verkhovna Rada MP Dmytro Kysylevskiy describes the program's contents:

Stimulating domestic production

- Refunding of successful pre-invasion rebate program for farmers that buy Ukraine-made agricultural equipment
- State subsidies for communities that purchase Ukraine-made school buses
- YeOselya state mortgage program stimulates demand for Ukrainian building materials
- Development of a cashback program in partnership with international credit card providers to incentive purchase of Ukraine-made consumer goods

Facilitating investment in the real economy

- Adaptation of selection criteria in popular state loan program "5-7-9" to favor manufacturer applicants
- Business modernization grant programs for purchasing equipment (up to around $200,000), with special conditions for applicants from de-occupied territories
- Reform procedures for changing land zoning to "industrial" so that processing time falls from 1-3 years to 1.5 months
- Tax and customs incentive package for manufacturers to locate in Ukrainian industrial parks
- Compensation of up to 30% of capital investment in new manufacturing and processing facilities with investment of over $12 million

Boosting value-added export

- Increase financing for Ukraine's Export Finance Agency to provide export insurance for manufactured goods
- Enhanced economic diplomacy, including on removal of trade barriers such as US anti-dumping measures against Ukrainian metal products

Ukraine's efforts to activate industrial parks as an instrument of growth are particularly noteworthy, coming as they do on the tail of 13 years of unsuccessful policy. For the first time the Ukrainian government is making state funds available for construction of physical infrastructure at industrial parks and has permitted local communities to spend their revenues on design documents for these parks. The prime minister announced the establishment of an office of Industrial Park Development on the successful model of Singapore, Turkey and Poland.[52] Manufacturers occupying these parks now have access to tax and customs rebates comparable to those they would receive in neighboring countries.

This has spurred a boom in registration of new industrial parks and a rise in occupancy levels at existing facilities. Around half of these new occupants are displaced enterprises from conflict-affected oblasts.

Kysylevskiy also described ambitious next steps that policymakers are studying, often looking to the industrial policy experience of EU neighbors:

- A Ukrainian Development Bank to provide "long money" for capital investments in new manufacturing facilities
- Return of 50-70% of capital investment costs in new facilities through phased tax rebates

a diplomatic effort to convince donors to purchase goods locally for their humanitarian and development assistance in Ukraine.[53] Within the limited proportion of the wartime state budget that is dedicated to business support, the government has rolled out a number of industry-friendly policies (see Insert "Made in Ukraine: Wartime support for manufacturing"). And yet the greatest potential for stimulating the industrial economy comes from public spending, be it funded by Ukrainian taxes or huge international grants and loans for Reconstruction. Ukraine should impose Local Content minimums on public purchasing that reflect realistic production capacity within the country (quite far from anything resembling an "import ban" or 100% "Buy Ukrainian" policy), but Kyiv may be holding back from such a move based on earlier EU opposition to Ukrainian industrial policy.

EU policy in this regard needs a re-think. Strictly speaking, under the precepts of the DCFTA Brussels has grounds to object to Ukraine giving preference to its own producers. But there is an unavoidable paradox: the EU would prefer unfettered access to Ukrainian state tenders while also playing the role of the largest loan provider to the Ukrainian government. And the looming scale of that debt burden has raised concerns of a future Ukrainian sovereign debt crisis.[54] Revival of the industrial economy is one of the only possible means by which Ukraine can generate the tax revenues necessary to repay those loans, but numerous factories are partially idled while foreign competitors meet a growing proportion of Ukrainian demand.

Nor is it really true that Local Content requirements would lift Ukrainian producers above the level playing field with EU competitors. In fact Ukrainian manufacturers are scrambling up the sides of Russian bomb craters, attempting to get back onto the playing field with their EU peers. Impeded by war-caused market failures like

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52 Statement of Prime Minister of Ukraine Denys Shmyhal at Meeting of the Government. March 29, 2024.https://bit.ly/4brNnGs

53 According to Verkhovna Rada MP Dmytro Kysylevskiy, the leaders in this practice are Denmark and Japan, though the United States and United Kingdom have also made significant purchases of Ukrainian-made equipment and materials

54 Eoin Drea. 2023. The EU is leading Ukraine into a sovereign debt crisis. Politico. https://www.politico.eu/article/european-union-ukraine-war-debt-crisis-aid-loans-18-billion/

CAPEX expenditures on repairs or relocating production, power cuts, blockaded ports and mobilized or displaced workers, Ukrainian companies struggle to claim their natural proportion of market share.

The potential for localization is real; Ukrainian building material producers could supply 80% of the products needed for reconstruction of damaged and destroyed buildings as of November, 2022.[55] Damage levels have increased hugely since then, but Ukrainian industry has not stood still, investing its limited funds in new production capacity in anticipation of the Big Reconstruction. The author of the 2020 Localization Law and strongest proponent of industrial policy in the Verkhovna Rada, Dmytro Kysylevskiy, says that Ukrainian industry can provide up to 55% of the parts needed for locomotive production, though no localization requirements were included in state agreements to procure US-made locomotives.[56]

In order to provide legal cover to the imposition of Local Content requirements on state procurement, Kyiv might choose to trigger the "national security exemption" contained in both the DCFTA and in the WTO Agreement on Government Procurement which states:

Nothing in this Agreement shall be construed to prevent any contracting party from taking any action which it considers necessary for the protection of its essential security interests taken in time of war or other emergency in international relations.

Before doing so, Kyiv should try to bring Brussels onboard with the necessary policy, so that it does not oppose it officially through WTO dispute mechanisms or by other means. There is already strong precedent for such thoughtful policy from the EU side, which after all threw a lifeline to both Ukrainian farmers and steelworkers by lifting quotas and tariffs on Ukrainian goods at the beginning of the invasion.[57] Access for Ukrainian steel to the EU market is the highest it has ever been, which is more than can presently be said for the US market, where tariffs were also lifted but where anti-dumping restrictions against Ukrainian steel remain in place.[58]

TOGETHER TO DECARBONIZATION?

Precisely at the moment that Ukraine has received unprecedented access to the EU market for its meta products, it is bracing for the revolution in market relations that will be wrought by the European Green Deal (EGD).

Specifically, the EU is rolling out the Carbon Border Adjustment Mechanism (CBAM) to impose a carbon tariff on imported steel, cement, fertilizer and other emission-intensive products that will vary in size based on how much CO2 was emitted during their production. The purpose is to ensure that EU producers facing growing decarbonization requirements under the EGD are not made uncompetitive in their own market by less-regulated foreign competitors.

Ukraine's position is precarious. It has the most energy-intensive industrial production in Europe; producing 1 million Euros of value added in EU industry uses about 1500 MWh, while in Ukraine it's more than 8000.[59] CBAM will make electric arc steelmaking more competitive than basic oxygen steelmaking, which has emission levels that are 4 times higher. At present 76% of Ukraine's remaining steel production uses the basic oxygen model, while the electric arc model is growing in the EU with government assistance.

Ukraine's metallurgy industry association GMK Center estimates that CBAM tariffs could make $1.4 billion worth of annual pig iron, square billet and long product production uncompetitive in the EU market. Given the key role of the EU market for Ukraine, this could lead to 25-35% production decreases in Ukraine's metals sector.[60]

Such measures inspire frustrated grumbling within Ukraine, where some enterprises feel that new barriers will always be found to keep their products out of export markets. An executive at Metinvest, the huge metallurgy holding owned by Ukrainian oligarch Rinat Akhmetov, recently noted that the EU is 50% of his company's market, "but these ecological rules that the European Commission is establishing for companies makes our integration impossible. Right now they are giving grants to European metallurgy enterprises, covering 50% of ecological modernization. But for us there won't be any such thing for a long time yet."[61]

In the near term Ukraine needs a temporary exemption from CBAM, which is possible under the law's force majeure clause that allows the EU to make exemptions "where an unforeseeable, exceptional and unprovoked event has occurred that is outside the control of one

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55 White Paper: Activating and Strengthening Ukraine's Reconstruction Capacity. 2023. Volodymyr Vlasiuk. Ukraine Industry Expertise and the International Institute of Economic Research. USAID Economic Resilience Activity

56 Ukrainian industry is capable of providing localization of locomotives to the level of 55%. 2024. Minprom (in Ukrainian). https://minprom.ua/news/310769.html

57 Expert: Cancellation of EU tariffs helped Ukrainian metallurgists hold out during wartime. 2024. Minprom (in Ukrainian). https://minprom.ua/news/311290.html

58 Interview with Stanyslav Zinchenko of the GMK Center, April 2024

59 Thinking About Ukraine's Energy Future: Energy demand scenarios and policy targets on the road to Europe. Presentation by Green Deal Ukraïna, October 9th 2023, Kyiv. Sponsored by DE Ministry of Education and Research.

60 GMK Center. 2024. CBAM impacts on iron and steel exports of Ukraine. https://gmk.center/wp-content/uploads/2023/09/2023CBAM_Impact-Eng_full.pdf

61 Akhmetov's people warn: European metallurgical companies could repeat the Polish protests. 2024. NV:New Voice of Ukraine. https://biz.nv.ua/ukr/markets/vikliki-ta-mozhlivosti-ukrajini-na-shlyahu-do-yevropeyskogo-soyuzu-50405390.html

or more third countries." But the initiative for such an exemption has not come yet either from the European Commission or the government of Ukraine.[62] The latter may be afraid to appear laggard on decarbonization, thus threatening its future EU membership chances.

But what about the modernization assistance needed for a long-term solution? It is true that Europe has been generous in support of its own steelmakers: from January 2023 to March 2024 EU countries and the UK announced €10.5 billion in grants to decarbonize production and make their steel mills more competitive in the context of the EGD and CBAM. The largest recipient of the funds distributed so far (28%) is the ArcelorMittal corporation, which besides support-receiving mills in Germany, Belgium, France and Spain also owns Ukraine's largest remaining steel mill in Kryvyi Rih.[63] Is there hope that Ukraine's western partners and particularly the EU will help Ukraine make the needed investments in Kryvyi Rih, Zaporizhzhia, Dnipro and elsewhere to ensure the survival of its metallurgy sector?

Stanislav Zinchenko, CEO of the GMK Center, is surprisingly upbeat. He points to the fact that all of Ukraine's serious metallurgy players had decarbonization investments planned before the 2022 full-scale invasion, and taken together they amount to just €15 billion. All these projects are based on installation of electric arc furnaces or Direct Reduced Iron production using Ukraine's excellent supplies of metalite iron ore, key to "green" steel production and largely absent within the EU. Such investments aren't unprecedented; the Interpipe company of Ukrainian oligarch Andrii Pinchuk invested around one billion dollars in an electric arc furnace complex in 2012 and reduced greenhouse gas emissions by 10 times.[64]

After huge wartime losses Zinchenko sees little potential for self-financing of these projects, and the Decarbonization Fund set up by Ukraine to use the revenue from its newly established emissions tax would at best be sufficient to cover loan guarantees for steel mills, but not the principle. But if Ukraine could gain accelerated access to the EU's Innovation Fund and other structural funds during the candidacy process then there is a chance of financing decarbonization projects. The climate impact in Ukrainian mills would be very high compared to projects within the EU that are trying to further shave down emission levels that are already amongst the world's lowest.[65]

A common EU-Ukraine green industrial policy is necessary. If Ukrainian industry miraculously recovered to pre-invasion levels at its current level of energy intensity, and Ukraine entered the EU, it would tank the bloc's ambitious 2050 decarbonisation goals.[66] A passive response of letting deindustrialization take its course would "solve" the problem of the country's remaining large emitters but would so hobble Ukraine's economy as to make real EU integration unrealistic. What is needed instead is ecological modernization to ensure that Ukraine, with its close proximity, rapid regulatory harmonization and rich supplies of ore appropriate for "green steel" becomes a manufacturing partner for Europe and not an impoverished raw material supplier.

Zinchenko and other industry leaders[67] point out that in order to decarbonize metallurgy Ukraine needs to not only modernize individual plants, but also increase the availability of green electricity. A start-of-the-art electric arc furnace will not produce green steel if it is powered by an inefficient brown coal power plant without modern filters. At present nuclear, hydro and a burgeoning wind and solar sector make about 20% of Ukraine's electricity production green, but expansion of wind and solar was blunted in the last pre-invasion years by bitter contention between the Ukrainian government and investors about changes to the green energy tariff.

As Russia ramps up attacks on Ukrainian power production including the Dnipro Hydroelectric Station, and has occupied and militarized one of the country's nuclear power plants at Enerhodar, it becomes clear that energy and industrial policy are deeply entwined. The CEO of Ukrenergo, Ukraine's transmission system operator, has said that the country should construct hundreds of small power plants in place of the 15-20 Soviet-era giants that Russia is currently bombarding. This would likely require both public and private sector input, and the Atlantic Council recently called on IFIs to prioritize financing of such energy projects.[68] Ideally, the Ukrainian government could offer incentives to guide these new investments towards the necessary proportion of green energy needed for CBAM compliance.

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62 Federica de Sario. 2024. The EU's carbon tax may devastate a country it is trying to keep alive: Ukraine. Politico, March 8, 2024 https://www.politico.eu/article/eu-carbon-tax-devastate-keep-alive-ukraine/

63 Andrii Tarasenko. 2024. European countries granted €10.5 bln for decarbonization of the steel sector in 2023-2024. GMK Center. https://gmk.center/en/infographic/european-countries-granted-e10-5-bln-for-decarbonization-of-the-steel-sector-in-2023-2024/

64 Vladyslav Varnavskyy. 2024. Why Ukrainian businesses need to start the green transition now. GMK Center. https://gmk.center/en/opinion/why-ukrainian-businesses-need-to-start-the-green-transition-now/

65 Interview with Stanislav Zinchenko, April 4, 2024.

66 Green Deal Ukraïna 2023

67 Varnavskyy 2024

68 Yuri Kubrushko. 2024. A decentralized power grid can help Ukraine survive Russian bombardment. Atlantic Council UkraineAlert. https://www.atlanticcouncil.org/blogs/ukrainealert/a-decentralized-power-grid-can-help-ukraine-survive-russian-bombardment/

Next in line for CBAM: Nitrogen fertilizer production in Ukraine

Metallurgy is just the first Ukrainian sector that will feel the pinch from CBAM. Among those that will also be affected is the crucial but politically fraught nitrogen fertilizer sector.

The majority of Ukraine's nitrogen fertilizer plants belong to oligarch Dmytro Firtash, who is under investigation by both Ukraine and the United States for alleged corruption and has taken residence in Austria to avoid extradition.[69] Firtash's tight connections with Russian gas exporters allowed him to supply four large fertilizer plants with relatively inexpensive natural gas (the raw material for production) but these arrangements came apart after Russia's first invasion in 2014. Russia provided its own fertilizer plants with subsidized natural gas, allowing it to flood the Ukrainian market with cheap product, which Ukraine's export-oriented grain and oilseed sector became increasingly reliant on.

In the years between the 2014 and 2022 invasions the Ukrainian government see-sawed between measures to support its domestic fertilizer industry, including anti-dumping rulings, embargoes on Russian fertilizer and state purchasing of Ukrainian production stocks, and measures to liberalize import to satisfy the agricultural lobby's interests in inexpensive fertilizer. Despite the importance of fertilizer plants to Ukraine's economy, support measures were always tainted with the appearance of subsidizing a pro-Russian oligarch. No major plants closed during this time, but their role in the domestic market, competitive position and level of modernization continuously slumped in comparison to foreign competitors.

Access to the affordable natural gas is even more difficult since Russia's 2022 invasion, and the Sievierodonetsk Azot fertilizer plant came under occupation in June of that year (following the Horlivka Stirol plant in 2014). After a sharp production drop in 2022 Ukraine's fertilizer plants rallied, but continued losing market share to imports. Poland has become a major exporter to Ukraine after its own market was flooded with cheap Russian and Belarusan fertilizer, which were not sanctioned by the EU for food security reasons.[70]

At the same time that they struggle in the domestic market, CBAM could squeeze Ukrainian fertilizer producers out of the EU market. Without state intervention this picture is unlikely to change. Industry players point to the practice of many EU states, which offer some protection and subsidies to domestic producers in order to ensure national food security and employment, while still allowing diverse imports to control prices and prevent monopoly.[71]

If Kyiv wants to follow its neighbors' example it would have to decide whether to push forward with industrial policies to support fertilizer production while the majority of production is still in Firtash's hands, or to first pursue the anti-monopoly measures against him that were first initiated in 2017, with uncertain duration. Securing affordable natural gas would require the cooperation of Ukraine's state gas company Naftogaz, which has been historically hostile to being an instrument of industrial policy. Any anti-dumping measures enacted during wartime would need to be accompanied by relief for war-affected farmers already struggling to afford fertilizer and other inputs. Finally, the fertilizer sector will face the same challenges as metallurgy in finding financing for decarbonization projects to meet the challenge of CBAM. Like many struggling corners of Ukraine's economy, the nitrogen fertilizer sector is in need of a systematic industrial policy strategy.

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69 Isobel Koshiw. 2023. Ukraine turns up pressure on exiled oligarch Dmytro Firtash. Financial Times. https://www.ft.com/content/003d27f5-3658-47d4-9ac9-d549dc92f63d

70 Iuliia Nemtseva. 2024. Ukrainian producers of fertilizer are losing the dometic urea market. Kurkul.com (in Ukrainian). https://bit.ly/3wPtWbK

71 Serhiy Ruban. 2017. A competitive fertilizer market: the choice between what is easy and what is right. AgroPortal (in Ukrainian). https://agroportal.ua/blogs/konkurentnyi-rynok-udobrenii-vybor-mezhdu-prosto-i-pravilno

PART III: RECOMMENDATIONS

BUILDING CAPACITY FOR INDUSTRIAL POLICY

To the Ukrainian government:

- Establish an Industrial Policy Council that answers to the Cabinet of Ministers and includes representation from pertinent ministries, parliamentary committees and the expert community that has the mandate to recommend legislative and regulatory changes to facilitate re-industrialization.

To Western governments:

- Assign embedded advisors and provide other forms of technical assistance (within the Council described above and elsewhere in the Ukrainian government) to increase Ukraine's capacity to design and implement industrial policy, including such topics as:
  - Examples of legislative framework for Local Content policies such as "Buy American";
  - Development of a register of domestic producers (considering varying levels of localization of production) for Local Content policies;
  - Harmonizing Localization and Local Content policies with WTO obligations.

To the Western think tank community:

- Make long-term funding available to Ukrainian economists and industrial experts on the design, application and adaptation of Industrial Policy. Support comparative analysis on industrial policy in Ukraine and in partner countries, particularly peers in the post-socialist space.

LOCALIZATION AND LOCAL CONTENT POLICY

To the Ukrainian government:

- Prepare legal analysis on the potential use of "national security exemption" to Ukraine's commitments on public procurement in WTO Agreement on Government Procurement and Annex XXI of the 2014 Ukraine-EU Association Agreement, for discussion within policy making organs and with partner governments.

To the Ukrainian government and competent bodies of the European Union:

- Establish a Localization Policy Working Group to pursue a common position on Localization and Local Content requirements in Ukrainian public procurement. This Working Group should address the extent that such policies will apply to producers from the European Union.
- Within this Working Group discuss the potential for Ukraine to apply a "national security exemption" to its commitments on public procurement.
- Produce a Ukraine/EU common policy on Localization that allows Ukraine to set minimums of local content in public procurement, which adheres to the following principles:
  - The policy is developed in the context of Ukraine's extraordinary wartime and Reconstruction needs and can be revisited once market conditions comparable to those within the EU are restored;
  - Localization should not tend towards exclusion of foreign suppliers from Ukrainian public procurement, but rather towards incentivization of integrated supply chains that include Ukrainian manufacturers;
  - Local Content minimums should be aligned with realistic production capacity within Ukraine to avoid imposing unrealistic requirements that will disrupt important public procurements.

To Western governments:

- Align aid policy to Ukraine to procure the maximum amount of goods from Ukrainian producers as possible.

INCREASING ARMS PRODUCTION

To the Ukrainian government:

- Continue to expand state support for rapid Research & Development in military technology. Consider establishment of hybrid (virtual/physical) innovation campus within Ukraine for joint R&D by Ukrainian and foreign producers;

- Expand state support mechanisms such as grants, subsidized facilities and equipment, reimbursement of relocation costs to private arms manufacturers;
- Permit export of defense products that are not in deficit in the UAF to improve economic sustainability of arms manufacturers. Policy must be accompanied by a communication campaign within Ukrainian society and with key partners to explain why export is appropriate for certain products even as Ukraine faces an overall deficit in arms.

To Western governments:

- Increase procurement of defense products from Ukrainian manufacturers to increase their economic viability and stability;
- Provide risk insurance (currently not extended to defense sector by IFIs) to joint ventures between Western and Ukrainian arms manufacturers.

DECARBONIZATION AND ENERGY EFFICIENCY AND RESILIENCE

To the Ukrainian government and competent bodies of the European Union:

- Negotiate a temporary exemption for Ukraine from the requirements of the Carbon Border Adjustment Mechanism, at least for the duration of the war and ideally including the first stages of Reconstruction.

To the European Union:

- Accelerate access to EU decarbonization funding for Ukrainian industry, prioritizing $15 billion in metallurgy decarbonization projects that were designed before Russia's invasion.

To international financial institutions (IFIs):

- Prioritize investment in decentralized electricity production (including at the level of autonomous, enterprise-level units), particularly green sources that will facilitate production of low-emission manufactured goods;
- Expand focus of energy efficiency financing programs to include industrial facilities to address the extraordinarily high energy intensity of industrial production in Ukraine.

FINANCING RE-INDUSTRIALIZATION

To the Ukrainian government:

- trengthen existing grant and subsidized credit programs for micro, small and medium manufacturers to establish or expand production;
- Increase support for industrial parks, incorporating lessons from particularly successful cases such as Ireland or Poland when regional specialization and R&D links with regional universities enhanced the impact of providing a physical space and tax and customs rebates;
- Emulate the example of the EU and institute phased tax rebates to return 50-70% of capital investment costs in new manufacturing facilities.

To the Ukrainian government and IFIs:

- Expand the existing 5-7-9 subsidized loan program, which presently provides low-cost credit only up to $1.7 million, which is not enough to finance capital investments in new processing. If select loans could reach $10 million, a significant proportion of the financing gap for small and mid-sized manufacturers would be covered.
- Explore design and financing options for a Ukrainian Development Bank, the mission of which would be to provide "long money" for major investments in the real economy (up to $100 million).
- Expand military risk insurance mechanisms such as MIGA and GERMES that are presently in the trial stage in Ukraine to facilitate at-scale investments in industrial production.

To the Ukrainian and Western governments:

- Identify production capacity of key industrial products lost in Ukraine due to Russian attacks, such as rail production,[72] for restoration through targeted grant programs from producer countries of the needed equipment.

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72 The AzovStal plant in Mariupol was Ukraine's monopoly producer of steel rails. Ukraine has imported rails from France since the destruction of AzovStal and the occupation of Mariupol

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Since 1991 Ukraine experienced one of the world's most sustained and severe cases of deindustrialization. Encouragement of neoliberal economic policy and association of industrial policy with oligarchic capture prevented effective state response, even as Ukraine's neighbors, democratic and autocratic alike, actively practiced industrial policy.

Localization of defense manufacturing is being successfully practiced by both the Ukrainian state and its Western partners, resulting in dramatic increases in production. Such an approach should be extended to civilian manufacturing sectors like building materials, machine building, food processing and pharmaceuticals that are needed in great volumes for the war effort and for reconstruction.

Ukrainian industry requires crash modernization and decarbonization to be competitive on the European market and allow the country's integration in the European Union. Kyiv and Brussels need to activate resources for ecological modernization of industry, beginning with $15 billion in green steel investments for Ukraine's devastated metallurgy sector.

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