TERROR IN THE DETAILS:

Western-made Components in Russia's Shahed-136 Attacks

IPHR International Partnership for Human Rights

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LEGAL DISCLAIMER

This report identifies several companies and governments who are believed to be involved in the manufacturing of components which have been acquired by the Russian military and used in their military hardware.

For the avoidance of doubt, we do not allege any legal wrongdoing on the part of the companies who manufacture the components and do not suggest that they have any involvement in any sanctions evasion-related activity.

Furthermore, we do not impute that the companies which make the components are involved in directly or indirectly supplying the Russian military or Russian military customers in breach of any international (or their own domestic) laws or regulations restricting or prohibiting such action.

Where a link is drawn between manufacturers and the weapons being used in suspected war crimes, this is done solely to highlight ethical and moral concerns.

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INTRODUCTION

The Shahed-136 is an Iranian loitering munition that targets stationary ground objects guided by a sophisticated navigation system. Described as "ingenious in its simplicity" by Dr Uzi Rubin, the former Director of the Israel Missile Defense Organization, it flies low and slow towards a target and detonates on impact. It is both ruthlessly accurate and inexpensive.

This report analyses ten suspected Russian war crimes carried out using the Shahed-136. The attacks targeted residential buildings, power plants, businesses, a school and a children's summer camp. In each instance, we have explored the circumstances around the attack, the presence of military objects or activity in the vicinity of targeted objects, the result of the attacks, including the level of damage and casualties, and the means by which we have identified the Shahed-136 as being used.

We find that Russia's attacks are, on the face of it, intentionally aimed at the civilian population and infrastructure, with no tangible military advantage gained as a result of them. These are fundamental conditions that must be met in order for an attack to be assessed as a war crime, and in each case study, we examine the legal background behind our assessment.

This report also explores the Shahed-136's documented reliance upon Western-made components, and in so doing, calls into question the effectiveness of sovereign export controls and corporate due diligence processes. Since Russia's February 2022 invasion, Western governments have worked to supply the Ukrainian armed forces with equipment, support, and training, but have done little to exploit the Russian military's Achilles heel: its reliance upon Western components.

In total, components from 16 companies based in the US, Japan, Canada, and Switzerland have been found inside the Shahed-136, ranging from microprocessors and semiconductors to batteries and memory." – we removed two companies and so now there are 16, and no German ones.

These findings are consistent with a wide range of existing research, including our previous report – 'Enabling War Crimes? Western-Made Components in Russia's War Against Ukraine' – that has explored the extent to which the weapons at the heart of Russia's committing of atrocities are, 'under the hood', reliant upon Western-made components in order to function.

Restricting Russia's access to such components would have a devastating and immediate effect on sustaining its war effort. Operating at a high tempo requires an equally high level of resupply and replenishment: Russia's drones, missiles, communication systems, and other equipment require regular repairs, maintenance, and restocking – all processes that require, to varying degrees, Western components. It would be just weeks before Russia's supply of these components dried up, which would have significant consequences on the battlefield.

This report serves two purposes. Firstly, to illustrate Russia's continued unlawful and barbaric assaults on the Ukrainian population, judged to be in conflict with International Humanitarian Law. Secondly, to sound the alarm as to the Russian military's reliance on Western-made components in its war against Ukraine and the urgent need to restrict the continued supply of such components.

The beginning of the solution is to recognise that the problem exists. Up to now, businesses and policymakers alike have remained predominantly silent on the issue of Russia's reliance on Western-made components. This has been justified, at least in part, by the fact that the causes of the situation – including the Russian military's supply chain – are difficult to track and as such, a challenge to put right. The reality, however, as this report demonstrates, is that civil society organisations and research groups can, using open-source intelligence, expose and trace these causes with immense precision. Lack of evidence or lack of understanding can no longer be used as a justification for inaction.

PART ONE:

WHAT ARE IHL VIOLATIONS AND WAR CRIMES?

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What is an IHL violation?

International Humanitarian Law (IHL) is a set of rules and principles that seeks to protect persons who are not or no longer directly or actively participating in hostilities and imposes limits on the means and methods of warfare.[1] An IHL violation is a violation of this set of rules, which can be found in the four Geneva Conventions of 1949, the Hague Conventions of 1907 and customary international law, which are the core sources of modern IHL[2]. IHL is part of public international law, which is made up primarily of international treaties (formed by states parties), customary international law (formed by "a general state practice accepted as law") and general principles of law (legal norms existing among the majority of nations).[3] IHL applies once the conditions for an armed conflict are factually met on the ground. For international armed conflicts, these conditions consist of one or more states' use of armed force against one or more other states, and for non-international armed conflicts. Armed confrontation between governmental armed forces and one or more non-state armed groups, or between such groups, may amount to non-international armed conflict and thus be governed by IHL if it reaches a certain level of intensity and organisation of non-state parties involved.[4]

What is a war crime?

The core principle behind the concept of war crimes is that individuals can be held criminally accountable for serious violations of IHL.

A serious IHL violation that amounts to a war crime must include one (or several) of the following three types of conduct:[5]

1. Endangering protected persons, e.g. willful killings,[6] torture,[7] intentional attacks on civilians,[8] killing of combatants rendered hors de combat[9] (incapable of fighting)[10];

2. Endangering protected objects, e.g. intentionally attacking civilian objects[11] including civilian dwellings, hospitals, schools; and

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1   ICRC, What is international humanitarian law? 06 April 2022, available at: *https://www.icrc.org/en/download/file/240610/what_is_ihl.pdf*

2   ICRC, International humanitarian law treaties: essential documents. 3 March 2022, available at: *https://blogs.icrc.org/cross-files/international-humanitarian-law-treaties-essential-documents/*

3   Article 38, the Statute of the International Court of Justice.

4   ICRC, What is international humanitarian law? 06 April 2022, p. 4, available at: *https://www.icrc.org/en/download/file/240610/what_is_ihl.pdf*

5   *Ibid.*

6   ICC Statute, Article 8(2)(a)(i)

7   ICC Statute, Article 8(2)(a)(ii)

8   ICC Statute, Article 8(2)(b)(i)

9   ICC Statute, Article 8(2)(b)(vi)

10   How law protects in war? , Hors de combat, available at: *https://casebook.icrc.org/a_to_z/glossary/hors-de-combat*

11   ICC Statute, Article 8(2)(b)(ii)

3. Breaching important values even without physically endangering persons or objects directly, e.g. declaring that no quarter will be given,[12] subjecting persons to humiliating treatment,[13] violating the right to a fair trial[14].

Currently, the most comprehensive list of examples of serious violations of IHL (war crimes) is contained in Article 8 of the Rome Statute of the International Criminal Court.[15]

War crimes, together with crimes against humanity, genocide, and the crime of aggression, are four core international crimes.[16] These crimes are considered to be of such gravity that they have no statute of limitation under international criminal law,[17] meaning that those committing the crimes can be brought to justice no matter how much time has passed since their commission.

The implementation of IHL is primarily the responsibility of states. They must respect, and ensure respect for, these rules in all circumstances.[18] IHL is universal: all parties fighting in a conflict are obliged to respect it, be they governmental forces or non-state armed groups[19]. The responsibility to prevent and punish IHL violations also belongs primarily to states. IHL requires states to investigate serious violations and, if appropriate, prosecute the suspects. This means that appropriate steps must be taken to implement the legal framework for criminal prosecution of IHL violations into a state's domestic criminal law. As a complement to domestic trials, internationally established criminal justice mechanisms, including the International Criminal Court (ICC), may promote greater respect for IHL by ensuring that the most serious IHL violations, e.g. war crimes, do not go unpunished.[20]

Who can prosecute IHL violations and war crimes?

States must adopt legislation and regulations aimed at ensuring full compliance with IHL. Additionally, states must investigate war crimes committed by their nationals or armed forces or on their territory and, if possible, prosecute the suspects.[21] Some states have also adopted national legislation allowing the prosecution of war crimes in their national courts, irrespective of the nationality of the offender

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12   IHL prohibits using this procedure, that is, ordering that there shall be no survivors, threatening the adversary therewith, or conducting hostilities on this basis. For more information, see How law protects in war?, Quarter, available at: *https://casebook.icrc.org/a_to_z/glossary/quarter-denial* ; ICC Statute, Article 8(2)(b)(xii); Hague Regulations (1907), Article 23(d); AP (I) 1949, Article 40; AP (II) 1949, Article 4(1).

13   ICC Statute, Article 8(2)(b)(xxi)

14   ICC Statute, Article 8(2)(a)(vi)

15   ICC, Rome Statute of the International Criminal Court, available at: *https://www.icc-cpi.int/sites/default/files/RS-Eng.pdf*

16   European Union Agency for Criminal Justice Cooperation. Core international crimes., available at: *https://www.eurojust.europa.eu/crime-types-and-cases/crime-types/core-international-crimes*; ICC. About the Court., available at: *https://www.icc-cpi.int/about/the-court*

17   ICC Statute, Article 29; See also: Convention on the Non-Applicability of Statutory Limitations to War Crimes and Crimes Against Humanity, available at: *https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-non-applicability-statutory-limitations-war-crimes*

18   Article 1 common to the four Geneva Conventions.

19   Rule 139 of Customary IHL, available at: https://ihl-databases.icrc.org/en/customary-ihl/v1/rule139; Common Article 3 to the Four 1949 Geneva Conventions; AP II, Art. 1(1); ICRC. Frequently asked questions on the rules of war. 07.03.2022, available at: *https://www.icrc.org/en/document/ihl-rules-of-war-faq-geneva-conventions*

20   *Ibid.*

21   Geneva Convention (III), art. 129; Geneva Convention (IV), art. 146; Additional Protocol I, art. 88.

or the place where the violations were committed (universal jurisdiction).[22] Domestic prosecution is, however, often impossible during or in the aftermath of an armed conflict if the regime that perpetrated the crimes retains power and is unwilling to prosecute its own representatives.[23]

Over the past 30 years, the international community has stepped in on several occasions to bridge the impunity gap created by the failure of domestic accountability by creating international ad hoc tribunals (ICTY/R),[24] hybrid tribunals (ECCC, SCSL, STL)[25] and the ICC.[26] The latter is a permanent international judicial body with jurisdiction over any core crime committed on the territory of its 123 member states or by its nationals,[27] and, in some cases, when a situation is referred to the Prosecutor of the ICC by the UN Security Council or a country submits a declaration with the Registrar of the ICC accepting the exercise of the ICC's jurisdiction[28], non-member states. Ukraine did not ratify the Rome Statute but recognised the jurisdiction of the ICC over international crimes committed on the territory of Ukraine from 21 November 2013 by submitting two declarations of the Verkhovna Rada of Ukraine to the ICC in 2014 and 2015.[29] After Ukraine recognised the ICC's jurisdiction, the Office of the Prosecutor of the ICC (OTP) conducted a seven-year-long preliminary examination and, in 2022, opened an investigation into the situation in Ukraine.[30] On 17 March 2023, the OTP issued arrest warrants for Russian President Vladimir Putin and Russian Commissioner for Children's Rights Maria Lvova-Belova for their alleged responsibility for the war crime of unlawful deportation of children[31] and the unlawful transfer of children from occupied areas of Ukraine to the Russian Federation.[32] [33]

These and other suspected perpetrators can be tried by ICC and, if found guilty, sentenced to up to 30 years in prison or to a term of life imprisonment when justified by the extreme gravity of the crime and the individual circumstances of the convicted person.[34]

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22   Trial International, Universal Jurisdiction, available at: *https://trialinternational.org/topics-post/universal-jurisdiction/*

23   Trial International, What are war crimes?, available at: *https://trialinternational.org/topics-post/war-crimes/*

24   ICTY, International Criminal Tribunal for the former Yugoslavia, available at: *https://www.icty.org/*; ICTR, International Criminal Tribunal for Rwanda, available at: *https://unictr.irmct.org/*

25   UN, International and Hybrid Criminal Courts and Tribunals, available at: *https://www.un.org/ruleoflaw/thematic-areas/international-law-courts-tribunals/international-hybrid-criminal-courts-tribunals/*

26   ICC, The International Criminal Court, available at: *https://www.icc-cpi.int/*

27   ICC, The States Parties to the Rome Statute, available at: *https://asp.icc-cpi.int/states-parties*

28   ICC Statute, Article 12(3), 13(b).

29   Verkhovna Rada of Ukraine. Declaration to the ICC., available at: *https://zakon.rada.gov.ua/laws/show/145-19#Text*

30   ICC. Statement of ICC Prosecutor, Karim A.A. Khan QC, on the Situation in Ukraine: "I have decided to proceed with opening an investigation." 22.02.2022, available at: *https://www.icc-cpi.int/news/statement-icc-prosecutor-karim-aa-khan-qc-situation-ukraine-i-have-decided-proceed-opening*

31   ICC Statute, Article 8(2)(a)(vii)

32   ICC Statute, Article 8(2)(b)(viii)

33   ICC, Situation in Ukraine, available at: *https://www.icc-cpi.int/situations/ukraine#:~:text=Jurisdiction%20in%20the%20general%20situation,(3)%20of%20the%20Statute*; ICC. Situation in Ukraine: ICC judges issue arrest warrants against Vladimir Vladimirovich Putin and Maria Alekseyevna Lvova-Belova. 17.03.2023, available at: *https://www.icc-cpi.int/news/situation-ukraine-icc-judges-issue-arrest-warrants-against-vladimir-vladimirovich-putin-and*;

34   *Ibid.*

PART TWO:

SUSPECTED WAR CRIMES CARRIED OUT BY THE SHAHED-136 IN UKRAINE

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Russia's full-scale invasion of Ukraine is the first international armed conflict involving the use of unmanned aerial vehicles (UAVs) as weapons at this scale.[35] Between September 2022, when Russia first began using widespread UAV attacks,[36] and May 2023, it launched more than 1,000 UAVs to attack Ukrainian critical energy and civilian infrastructure.[37]

By the end of 2022, Russian attacks on energy infrastructure had left millions of Ukrainians without heating, electricity, water and other vital services during the cold winter months. As of 31 January 2023, at least 116 civilians have been killed, and at least 379 more have been injured in such attacks.[38]

In May 2023, Russia intensified its aerial attacks against Ukrainian cities, launching at least 20 waves of UAVs and missiles.[39] On the night of 28 May 2023, Kyiv alone was attacked by 54 Shahed 136/131, making it the largest Russian UAV attack to date.[40]

As demonstrated throughout this report, there is no evidence to suggest that Russian aerial attacks have affected the Ukrainian military or decision-making centres significantly. Instead, these attacks are part of the broader pattern of the Russian military's intentional terror campaign against the Ukrainian people.

The authors of this report documented 25 Russian UAV attacks on Ukraine between September 2022 and May 2023.[41] Cases were discarded where there was insufficient information to establish the target's status (military/civilian), the level of damage caused, or the model of the UAV used in the attack. Ten attacks were then selected for inclusion in this report, on the basis that they caused serious damage and civilian casualties, and used the Shahed-136.

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35   Dominika Kunertova (2023) The war in Ukraine shows the game-changing effect of drones depends on the game, Bulletin of the Atomic Scientists, available at: *https://www.tandfonline.com/doi/full/10.1080/00963402.2023.2178180*; Washington Post, Russia and Ukraine are fighting the first full-scale drone war, 2 December, 2022, available at: *https://www.washingtonpost.com/world/2022/12/02/drones-russia-ukraine-air-war/*; National Interest, The War in Ukraine Has Revolutionized Drone Warfare, 11 January 2023, available at: *https://nationalinterest.org/feature/war-ukraine-has-revolutionized-drone-warfare-206095*; Scientific American, Drone-on-Drone Combat in Ukraine Marks a New Era of Aerial Warfare, 3 April 2023, available at: *https://www.scientificamerican.com/article/drone-on-drone-combat-in-ukraine-marks-a-new-era-of-aerial-warfare/*; Sky News, Ukraine has set the stage for a new era of war - and AI could supercharge it, 7 May 2023, available at: *https://news.sky.com/story/dawn-of-the-drone-wars-how-ukraine-conflict-has-set-stage-for-new-military-capabilities-12874999*

36   Euronews, Russia using drones to save ammunition in Ukraine, available at: *https://www.euronews.com/2023/04/20/russia-using-drones-to-save-ammunition-in-ukraine#:~:text=The%20Institute%20for%20the%20Study,their%20ammunition%20since%20September%202022*

37   Ukrainian government figures compiled by IPHR

38   OHCHR, Report on the Human Rights Situation in Ukraine, 24 March 2022–31 January 2023, 24 March 2023, p. 11, available at: *https://www.ohchr.org/sites/default/files/documents/countries/ukraine/2023/23-03-24-Ukraine-35th-periodic-report-ENG.pdf*

39   Kyiv Post, 'Russia's Month of Missile Madness: 90% of Projectiles Failed, $1.7 Billion Spent', 31 May 2023, available at: *https://archive.ph/zrij8*

40   Air Force of the Armed Forces of Ukraine, 52 Shaheds destroyed, 28 May 2023, available at: *https://archive.ph/RqZqw*

41   According to IPHR's internal database on Russian attacks on Ukraine based on information from open sources.

The attacks documented in this report killed 15 civilians and injured another 42. In addition, they destroyed or damaged nine critical infrastructure objects, 13 civilian houses and four other civilian objects.

The Shahed-136 is considered to be a guided weapon. It navigates using a combination of GPS and GLONASS, while a commercial-grade digital communication chip within it allows for a target's location to be updated mid-flight, or even for the intended target to be changed entirely while still in the air.

Targets are selected and struck with precision, and it is therefore reasonable to assume that in the case studies below and the plethora of other strikes in recent months, the Shahed-136 is impacting its intended target, rather than experiencing any level of deviation.

The ten attacks analysed in this report may constitute grave breaches of IHL and war crimes of directing attacks against protected civilian objects and directing attacks against civilians. Additional investigations would be required to corroborate these allegations to a judicial standard.

Case Study No. 1

DATE: 11 OCTOBER 2022

LOCATION: LADYZHYN, VINNYTSIA OBLAST

INCIDENT: ATTACK ON ENERGY INFRASTRUCTURE

On 11 October 2022, Russian forces attacked energy infrastructure across six regions in western, central and southern Ukraine.[42] According to the Ukrainian military, the attacks were carried out using Kh-101 missiles[43] and Shahed-136 UAVs.[44]

One of the Shahed-136 attacks damaged a thermal power plant in Ladyzhyn, Vinnytsia Oblast.[45] [46] A second strike, following shortly after the first one, injured six emergency workers who were responding

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42   TSN, 'Russia attacked the Ladyzhynska TPP in Vinnytsia Oblast with kamikaze drones: what is known', 11 October 2022, available at: *https://archive.ph/iaAJ0*.

43   Like Shahed-136, Kh-101 missiles contain Western components. Russia uses them in its systematic attacks on civilian objects in Ukraine. For more information, see: Enabling War Crimes? Western-Made Components in Russia's War Against Ukraine, Joint report by NAKO and IPHR, available at: *https://www.iphronline.org/wp-content/uploads/2023/02/Enabling-War-Crimes-report-final.pdf*

44   Air Force of the Armed Forces of Ukraine, '20 cruise missiles and 13 UAVs-kamikaze were destroyed (summarised information for October 11)', 11 October 2022, Available at: *https://archive.ph/EjF6J*.

45   Coordinates of the impact site: 48.70680161886597, 29.22011808294714.

46   Ukrainska Pravda, 'Russians hit Vinnytsia region', 11 October 2022, available at: *https://archive.ph/lnwDw*; DTEK Ladyzhynska TPP, 'The Ladyzhynska TPP was hit again by Russian terrorist forces', 11 October 2022, available at: *https://archive.ph/5HPZ1*.

to the first attack.[47] The attacks caused severe damage to the Ladyzhyn power plant, leaving some 18,000 civilians without heating for at least two months during winter.[48]

Source: Vinnytsia Region Prosecutor's Office

47   DTEK Ladyzhynska TPP, 'The Ladyzhynska TPP was hit again by Russian terrorist forces', 11 October 2022, available at: *https://archive.ph/5HPZ1*.

48   Ukrainska Pravda, 'Vinnytsia Oblast: TPP attacks create emergency situation in Ladyzhyn', 28 November 2022, available at: *https://archive.ph/AGXgt*; Vinnytsia Regional Military Administration, 'Restoration of heat supply in Ladyzhyn, limitation of electricity consumption, the state of the medical system of the region - the key issues of the meeting of the Head of RMA Serhiy Borzov with the heads of structural divisions', 23 January 2023, available at: *https://archive.ph/qoOXa*; Serhiy Borzov, 'Heat supply has been restored in Ladyzhyn', 1 December 2022, available at: *https://www.facebook.com/borzov.s.s/posts/pfbid0348nKLjSzJ4gV2yhz735zrCSivBcgKwemjMRrgbBgRAKTLAxpcXSVaoKJ8XpsCmZ9l*.

Case Study No. 2

14

DATE: 17 OCTOBER 2022

LOCATION: KYIV

INCIDENT: ATTACK ON ENERGY INFRASTRUCTURE, AN APARTMENT BUILDING, AND AN OFFICE BUILDING

On the morning of 17 October 2022, Russian forces attacked Ukrainian cities with missiles and UAVs,[49] directing some 28 UAVs at Kyiv.[50] The first attack took place at around 7 a.m. and targeted an office building in Shevchenkivskyi District, setting it on fire and damaging several nearby residential buildings.[51] The use of the Shahed-136 was confirmed by both the US Defence Intelligence Agency[52] and the General Staff of the Armed Forces of Ukraine.[53] The Mayor of Kyiv, Vitaliy Klitschko, published a photo of one of the UAV's remnants; this can be identified as the Shahed-136.[54]

The second attack followed an hour later. Four UAVs targeted several energy infrastructure facilities[55] [56] and an apartment building in downtown Kyiv.[57] [58] The attack on the apartment building killed five

49   Media Center Ukraine, 'Air defence shot down 85% of Iranian drones, which the Russian Federation used to attack Ukraine since the evening of October 16', 17 October 2022, available at: *https://www.youtube.com/watch?v=Whmak-FgFMY*; Suspilne. Media, About 30 drones were launched at Kyiv, 25 of them were shot down by AFU — Monastyrskyi'', 17 October 2022, available at: *https://archive.ph/8Mh5U*.

50   Kyiv City Official, 'In the morning, 28 drones flew in the direction of Kyiv', 17 October 2022, available at: *https://archive.ph/ZwONi*; The Guardian, ''Kamikaze' drones hit Kyiv despite Putin's promise of no further strikes', 17 October 2022, available at: *https://archive.ph/2MSjm*; BBC News, 'Ukraine war: Russia dive-bombs Kyiv with 'kamikaze' drones', 17 October 2022, available at: *https://archive.ph/eT9lY*.

51   NV, 'Drone attack on Kyiv: a fire broke out in a non-residential building, several buildings were damaged - Klitschko', 17 October 2022, available at: *https://archive.ph/wiw0M*; Vitaliy Klitschko, 'As a result of the drone attack, a fire broke out in a non-residential building in the Shevchenkivskyi district of Kyiv.', 17 October 2022, available at: *https://archive.ph/ZMX3p*; The Guardian, ''Kamikaze' drones hit Kyiv despite Putin's promise of no further strikes', 17 October 2022, available at: *https://archive.ph/2MSjm*; Slovo i Dilo, 'Attack on Kyiv by kamikaze drones: a non-residential building is on fire', 17 October 2022, available at: *https://archive.ph/XGGT4*.

52   Defence Intelligence Agency, 'Iranian UAVs in Ukraine: A Visual Comparison', 27 October 2022, available at: *https://www.dia.mil/Portals/110/DIA_Iranian_UAVs_in_Ukraine-A_Visual_Comparison.pdf*, p. 1.

53   General Staff of the Armed Forces of Ukraine, 'Operational information as of 18:00 on 17.10.2022 regarding the Russian invasion', 17 October 2022, available at: *https://archive.ph/2ruNA*.

54   Vitaliy Klitschko, 'A fragment of one of the kamikaze drones', 17 October 2022, available at: *https://archive.ph/GjlYy*.

55   Denys Smyhal, 'This morning, Russian terrorists once again attacked the energy infrastructure of Ukraine in three regions', 17 October 2022, available at: *https://archive.ph/vCfDU*; Ukrenergo, 'As a result of the terrorist attack, energy infrastructure facilities in the central and northern regions of Ukraine were damaged', 17 October 2022, available at: *https://archive.ph/puLnn*.

56   Ukrainian authorities often do not disclose specific objects that were attacked by Russia as it can further compromise their security or serve as an additional reference point for new Russian attacks.

57   Coordinates of the impact site: 50.44176516396034, 30.496571000000003.

58   Suspilne.Media, '5 drones and 4 killed persons: the police disclosed the details of the morning attack on Kyiv', 17 October 2022, available at: *https://archive.ph/pGiV4*; Vitaliy Klitschko, 'An explosion in the Shevchenkivskyi district', 17 October 2022, available at: *https://archive.ph/kcZpi*.

civilians, including a pregnant woman.[59] 19 more civilians were rescued from under the rubble.[60] Three people, including two rescue workers,[61] were hospitalised with injuries.[62] As a result of the attack, the 120-year-old apartment building – which was part of Kyiv's historical downtown – was damaged beyond repair.[63]

UAV and missile attacks on Kyiv, Sumy and Dnipropetrovsk regions that day caused black-outs in hundreds of settlements across the regions.[64]

Sources: https://t.me/vitaliy_klitschko/1555; https://t.me/V_Zelenskiy_official/3675

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59   Vitaliy Klitschko, 'The body of another deceased resident was found from under the rubble of a building in the centre of the capital', 17 October 2022, available at: *https://archive.ph/RFrSE*; National Police of Ukraine, 'Another shelling of the centre of the capital on Monday', 17 October 2022, available at: *https://archive.ph/Shm6M*; The Guardian, ''Kamikaze' drones hit Kyiv despite Putin's promise of no further strikes', 17 October 2022, available at: *https://archive.ph/2MSjm*; BBC News, 'Ukraine war: Russia dive-bombs Kyiv with 'kamikaze' drones', 17 October 2022, available at: *https://archive.ph/eT9lY*.

60   State Emergency Service of Ukraine, 'Russian attack on the capital in the morning of 17 October', 17 October 2022, available at: *https://archive.ph/q8plE*; Tymoshenko Kyrylo, 'Kyiv. As of now, 19 people have been rescued, 4 were injured, and 2 people died', 17 October 2022, available at: *https://archive.ph/FqWq0*.

61   Kyiv City Council, 'Vitaliy Klitschko: As a result of the kamikaze drone attack in the capital, four people died. Three Kyiv residents were hospitalised. Two of them were lifeguards', 17 October 2022, available at: *https://archive.ph/0iaES*.

62   Suspilne.Media, 'Kamikaze drones hit a residential building in Kyiv, there are dead people. What is known about the Russian forces attack', 17 October 2022, available at: *https://archive.ph/25Ujm*; Vitaliy Klitschko, 'The body of a dead woman was recovered from the rubble of a house in Shevchenkivskyi district, where an explosion occurred as a result of a drone attack', 17 October 2022, available at: *https://archive.ph/OXnkS*.

63   Tkachenko Oleksandr, 'Russia continues to terrorise the civilian population', 17 October 2022, available at: *https://archive.ph/h9TEi*; Map of Renovation, 'In the morning, Russia again attacked the center of Kyiv', 17 October 2022, available at: *https://archive.ph/RU66e*.

64   Denys Smyhal, 'This morning, Russian terrorists once again attacked the energy infrastructure of Ukraine in three regions', 17 October 2022, available at: *https://archive.ph/vCfDU*; Ukrenergo, 'As a result of the terrorist attack, energy infrastructure facilities in the central and northern regions of Ukraine were damaged', 17 October 2022, available at: *https://archive.ph/puLnn*;

      Serhiy Lysak, 'New attack on the region', 17 October 2022, available at: *https://archive.ph/sLec5*;

      BBC News, 'Ukraine war: Russia dive-bombs Kyiv with 'kamikaze' drones', 17 October 2022, available at: *https://archive.ph/eT9lY*.

Case Study No. 3

DATE: 9 NOVEMBER 2022
LOCATION: DNIPRO, UKRAINE
INCIDENT: ATTACK ON A BUILDING OF A DELIVERY COMPANY

On the night of 9 November 2022, Russian forces launched a UAV attack on a storage facility used by the Nova Poshta delivery company in Dnipro.[65] [66]

The fire caused by the attack significantly damaged the building and destroyed most of its equipment and parcels.[67] Four Nova Poshta employees were hospitalised with severe injuries.[68]

Local authorities published pictures of Shahed-136 remnants discovered at the scene. The Russian Ministry of Defense described this attack as "the destruction of the ammunition of the Armed Forces of Ukraine."[69] The Office of the Prosecutor of Dnipropetrovsk Oblast said however that there were no military targets in the area that was attacked.[70] No military personnel were killed or wounded.[71] Additionally, the company's Terms and Conditions prohibit the shipment of any weapons[72] and there is no evidence of any direct cooperation or relationship between the Armed Forces of Ukraine and Nova Poshta.

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65   Coordinates of the impact site: 48.47155079634144, 35.116388223042435.

66   Serhiy Lysak, 'A delivery company in Dnipro after a night strike by enemy drones', 9 November 2022, available at: *https://archive.ph/9FshA*.

67   Nova Poshta, 'One of our depots in Dnipro was destroyed tonight as a result of a drone attack', 9 November 2022, available at: *https://www.facebook.com/nova.poshta.official/posts/pfbid0U4wdoB3yqJnSuPEVfHYwSb1LFNUBhbmF8xBN7pWjhgQuaqS8gQodgvRLdJAr3WkKl*; Mykola Lukashuk, 'Full-scale military invasion of the Russian Federation in Ukraine, day 259', 9 November 2022, available at: *https://archive.ph/rE2gc*.
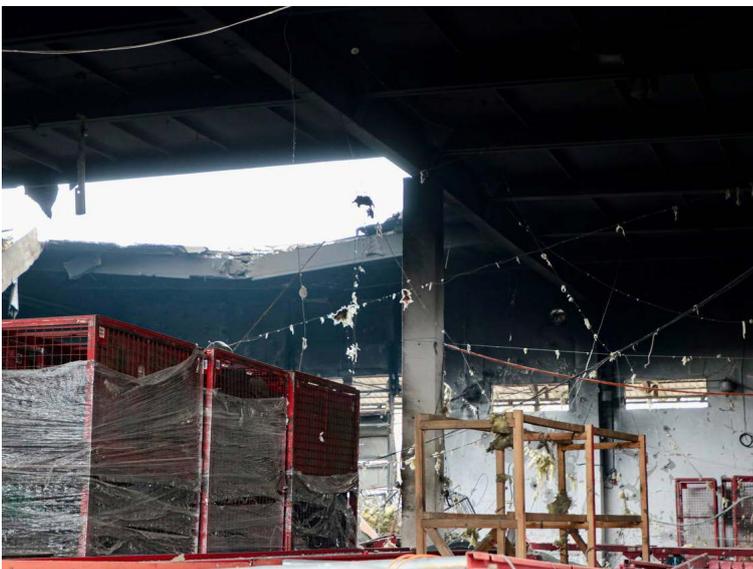
68   Nova Poshta, 'One of our depots in Dnipro was destroyed tonight as a result of a drone attack', 9 November 2022, available at: *https://www.facebook.com/nova.poshta.official/posts/pfbid0U4wdoB3yqJnSuPEVfHYwSb1LFNUBhbmF8xBN7pWjhgQuaqS8gQodgvRLdJAr3WkKl*; Dnepr Operatyv, 'Night attack on Dnipro: fire, injured people and destruction', 9 November 2022, available at: *https://archive.ph/dTDgy*; Fakty, 'Drone attack: the Russian Federation targeted an enterprise in Dnipro. Four workers are in the hospital', 9 November 2022, available at: *https://archive.ph/HKaiA*.

69   Ministry of Defense of Russia, 'Report of the Ministry of Defense of the Russian Federation on the progress of the special military operation on the territory of Ukraine', 9 November 2022, available at: *https://archive.ph/ykrJf*.

70   Office of the Prosecutor of Dnipropetrovsk Oblast, The Russian military attacked the city of Dnipro with kamikaze drones - an investigation has been launched, 9 November 2022, available at: *https://archive.ph/oSWea*

71   Nova Poshta, 'One of our depots in Dnipro was destroyed tonight as a result of a drone attack', 9 November 2022, available at: *https://www.facebook.com/nova.poshta.official/posts/pfbid0U4wdoB3yqJnSuPEVfHYwSb1LFNUBhbmF8xBN7pWjhgQuaqS8gQodgvRLdJAr3WkKl*.

72   NovaPoshta. Terms_of_Service, available at: *https://novaposhta.ua/uploads/misc/doc/Terms_of_Service.pdf*

Case Study No. 4

DATE: 10 DECEMBER 2022
LOCATION: ODESA OBLAST
**INCIDENT: ATTACK ON ENERGY INFRASTRUCTURE**

On 10 December 2022, Russian forces launched a UAV attack on two energy infrastructure facilities in Odesa Oblast.[73] It took firefighters more than four hours to extinguish the fire started by the attack.[74]

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73   Office of the Prosecutor General, 'Shelling of energy infrastructure in Odesa region - an investigation has been launched', 10 December 2022, available at: *https://archive.ph/SAdOp*; ZN.UA, 'At night, the occupiers shelled the critical infrastructure of Odesa', 10 December 2022, available at: *https://archive.ph/CL3nh*.

74   Our Odessa, 'About 4-4:30 hours have already passed from the moment of attack, but it still not possible to extinguish it', 10 December 2022, available at: *https://archive.ph/Iqzij*.

The attack caused a total electricity blackout in Odesa and Odesa Oblast, which affected some 1.5 million residents.[75] The next day, 300,000 people were still without electricity.[76] Local authorities had to mandate restrictions on energy use in the region for the following five days as a result of the damage reducing the network's ability to fulfil demand.[77]

The Odesa Regional Prosecutor's Office confirmed that Russian forces used the Shahed-136 to carry out the attack.[78]
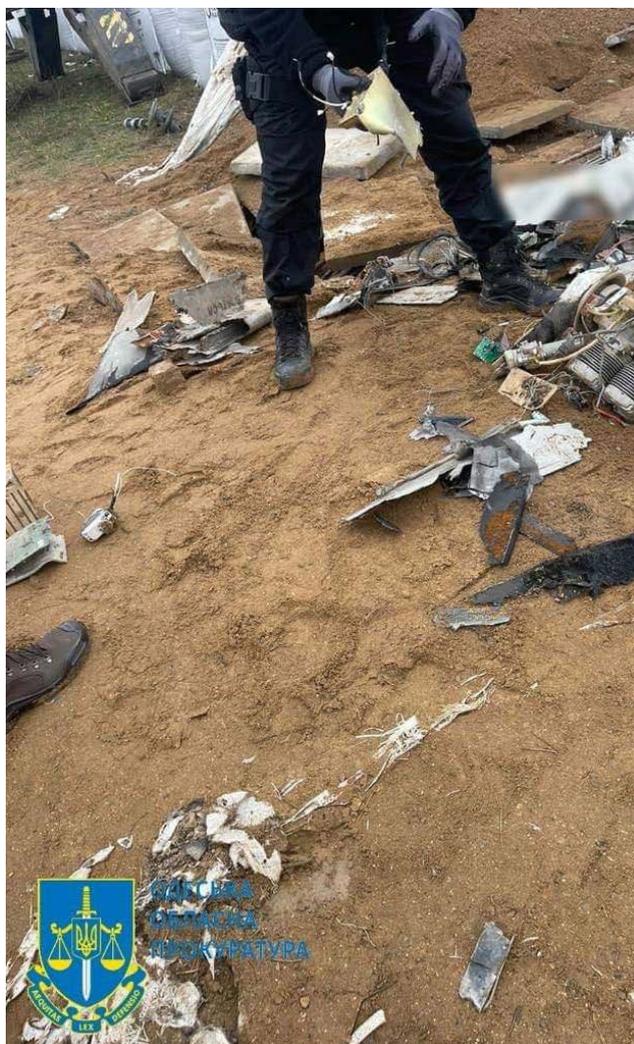
Source: Odesa Region Prosecutor's Office

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75   Suspilne Odesa, 'After a night strike by drones, more than one and a half million people in Odesa remain without electricity', 10 December 2022, available at: *https://archive.ph/C20Yx*; DTEK Odesa Electricity Networks, 'Power engineers of DTEK and NEC Ukrenergo are restoring the region's energy infrastructure after an enemy attack', 10 December 2022, available at: *https://www.facebook.com/dtekoem/posts/pfbid0Zm6pYmvWCTC6wM25QT5gwB9iHoTcoi9Egs31K84oo4u1ZJAH4r8xbXjRnyhXED8sl*

76   Suspilne.Media, '300,000 people in Odesa remain without electricity', 11 December 2022, available at: *https://archive.ph/6n05A*; Suspilne Odesa, 'Odesa is without electricity after the drone attack: all the sockets in the shops are in use', 11 December 2022, available at: *https://archive.ph/qKvvh*.

77   Suspilne.Media, 'Emergency power outages continue in Odesa, and extra-emergency power outages continue in the region', 15 December 2022, available at: *https://archive.ph/WKwjk*; Suspilne.Media, 'In Odesa Oblast, electricity will continue to be turned off not according to the schedule', 13 December 2022, available at: *https://archive.ph/F2aE8*.

78   Office of the Prosecutor General, 'Shelling of energy infrastructure in Odesa region - an investigation has been launched', 10 December 2022, available at: *https://archive.ph/SAdOp*.

Case Study No. 5

DATE: 28–29 DECEMBER 2022
LOCATION: KHARKIV
INCIDENT: ATTACK ON ENERGY INFRASTRUCTURE

On the night of 28–29 December 2022, Russian forces attacked critical energy infrastructure in Kharkiv with 13 UAVs. 11 of them were shot down by Ukrainian Air Defence while two hit critical infrastructure, leaving some 1,000 civilian homes without heating.[79]

The General Staff of the Armed Forces of Ukraine and the Kharkiv Regional Prosecutor's Office reported that the UAVs used in the attacks were Shahed-136.[80]

Source: Kharkiv Region Prosecutor's Office

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79   Oleg Synegubov, 'The situation in Kharkiv region', 29 December 2022, available at: *https://www.facebook.com/synegubov.oleg/videos/697234561893799/?t=0*; Oleg Synegubov, 'Late yesterday evening, Kharkiv suffered a massive attack by "Shahed" kamikaze drones', 29 December 2022, available at: *https://archive.ph/anb69*.

80   General Staff of the Armed Forces of Ukraine, 'Operational information as of 6:00 on 29.12.2022 regarding the Russian invasion', 29 December 2022, available at: *https://archive.ph/Uy1F1*; Kharkiv Regional Prosecutor's Office, 'The Russian military attacked Kharkiv with drones and missiles', 29 December 2022, available at: *https://archive.ph/MVb8t*.

Case Study No. 6

DATE: 10 FEBRUARY 2023
LOCATION: SHEPETIVKA, KHMELNYTSKYI OBLAST
INCIDENT: ATTACK ON ENERGY INFRASTRUCTURE

On 10 February 2023, Russian forces launched a massive attack on Ukraine with 20 Shahed-136/131 UAVs[81] and 71 Kh-101, X-555 and Kalibr missiles.[82] [83] Local authorities reported Shahed-136/131 attacks in Khmelnytskyi Oblast and Dnipropetrovsk Oblast.[84]

One UAV damaged a critical infrastructure facility in Shepetivka, Khmelnytska Oblast, causing a fire[85] and a two-day blackout.[86]

The local authorities reported that the Ukrainian Air Defence shot down four Russian Shahed-136/131 that were trying to target energy infrastructure facilities in Dnipropetrovsk Oblast.[87]

Sources: https://t.me/shepetivka/18011; https://t.me/khmelnytskaODA/1356

81   Air Force Command of UA Armed Forces, '20 UAVs 'Shahed-136/131' were shot down', 11 February 2023, available at: *https://archive.ph/eujdJ*.

82   Like Shahed-136, these missiles contain Western components. Russia uses them in its systematic attacks on civilian objects in Ukraine. For more information, see: Enabling War Crimes? Western-Made Components in Russia's War Against Ukraine, Joint report by NAKO and IPHR, available at: *https://www.iphronline.org/wp-content/uploads/2023/02/Enabling-War-Crimes-report-final.pdf*

83   Radio Svoboda, '61 out of 71 missiles shot down: Air Force reports on air defence operation during Russian attack', 10 February 2023, available at: *https://archive.ph/orWZA*

84   Radio Svoboda, 'Consequences of the morning Russian air attack on 10 February: S-300, X-101, X-555, Kalibr, drones', 10 February 2023, available at: *https://archive.ph/LoveQ*.

85   Khmelnytska ODA, 'At night, the enemy once again attacked our country with Shahed', 10 February 2023, available at: *https://archive.ph/i4oFo*; Khmelnytska ODA, 'There is a hit to an object of critical infrastructure of the Khmelnytskyi community', 10 February 2023, available at: *https://archive.ph/vhBJm*.

86   City of Shepetivka, 'Power engineers managed to stabilise the situation with the supply of electricity in the region', 11 February 2023, available at: *https://archive.ph/EmPLf*.

87   Chas.News, 'Kamikaze drone attack. Three aerial targets were shot down over Mykolaiv Oblast', 10 February 2023, available at: *https://archive.ph/CIIBQ*.

Case Study No. 7

DATE: 8–9 MARCH 2023
LOCATION: KYIV, ZHYTOMYR, SUMY, AND ODESA REGIONS
INCIDENT: LARGE-SCALE ATTACKS ON CIVILIAN OBJECTS AND ENERGY INFRASTRUCTURE

On the night of 8–9 March 2023, Russian forces attacked Ukrainian civilian infrastructure across Ukraine with eight Shahed-136/131 UAVs and 81 missiles,[88] including Kh-101 and Kalibr.[89] [90]

In Zhytomyr Oblast, a UAV hit an energy infrastructure facility, leaving 150,000 civilian users without electricity and water until the evening.[91]

Dnipropetrovsk Oblast meanwhile was attacked by UAVs, missiles and artillery fire, causing significant damage to the energy infrastructure and killing one civilian.[92] Other UAVs were shot down over Kyiv and Sumy Oblast.[93]

Source: https://t.me/ok_pivnich1/1481?single

88   Commander-in-Chief of the Armed Forces of Ukraine, 'The occupiers launched 81 rockets from various bases', 9 March 2023, available at: *https://archive.ph/uWnSN*.

89   Like Shahed-136, these missiles contain Western components. Russia uses them in its systematic attacks on civilian objects in Ukraine. For more information, see: Enabling War Crimes? Western-Made Components in Russia's War Against Ukraine, Joint report by NAKO and IPHR, available at: *https://www.iphronline.org/wp-content/uploads/2023/02/Enabling-War-Crimes-report-final.pdf*

90   Radio Svoboda, 'Consequences of the massive Russian shelling of Ukraine on March 9: "Happy Birthday to Taras Shevchenko"', 9 March 2023, available at: *https://archive.ph/hmXJC*; NV, 'A new attack on energy facilities. The Russian Federation attacked Kyiv and 10 regions, the ZNPP managed to recover after a blackout, five people died in Zolochiv', 9 March 2023, available at: *https://archive.ph/ow60Q*

91   Zhytomyrska ODA, 'Tonight, the enemy attacked Zhytomyr Oblast with kamikaze drones', 9 March 2023, available at: https://archive.ph/ODcBs#selection-173.1-175.45 ; Zhytomyrska ODA, 'Solving the issues of the fastest restoration of sustainable energy supply to the residents of the region', 9 March 2023, available at: *https://archive.ph/d6hJ5*; Zhytomyr.Info, 'At night, the enemy hit Zhytomyr with "Shaheds": a city without electricity and water', 9 March 2023, available at: *https://youtu.be/rm_LnINRphk*

92   Serhiy Lysak, 'The enemy attacked Dnipropetrovsk region with drones and missiles', 9 March 2023, available at: *https://archive.ph/jUHop.*

93   OK Pivnich, 'The wreckage of the "Shahed" shot down by the Defense Forces of the Sivershchyna in Sumy', 9 March 2023, available at: *https://archive.ph/tJRmD*; Kyiv City Military Administration, 'Night air attack. Operational information', 9 March 2023, available at: *https://archive.ph/wBru8*.

Case Study No. 8

DATE: 18 MARCH 2023
LOCATION: NOVOMOSKOVSK, DNIPROPETROVSK OBLAST
INCIDENT: ATTACK ON ENERGY INFRASTRUCTURE AND CIVILIAN HOUSES

On the night of 18 March 2023, Russian forces launched an attack with five UAVs on Novomoskovsk, Dnipropetrovsk Oblast.[94] Two UAVs hit and significantly damaged a critical infrastructure object with oil products,[95] destroyed four nearby civilian houses and damaged another six.[96]

The General Staff of the Ukrainian Armed Forces confirmed that the attack was launched by a Shahed-136 UAV.[97]

Sources: https://t.me/dneproperatyv/58470'; https://t.me/dneproperatyv/58216

Case Study No. 9

DATE: 22 MARCH 2023
LOCATION: RZHYSHCHIV, KYIV OBLAST
INCIDENT: ATTACK ON TWO DORMITORIES AND A SCHOOL

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94 Serhiy Lysak, 'That night, the Russian army attacked Dnipropetrovsk region with drones, probably "Shaheds"', 18 March 2023, available at: *https://archive.ph/UuND7*; Nikopol News, 'On the night of 18 March, the occupiers attacked Dnipropetrovsk region with drones', 18 March 2023, available at: *https://archive.ph/c7JUG*.

95 Serhiy Lysak, 'That night, the Russian army attacked Dnipropetrovsk region with drones, probably "Shaheds"', 18 March 2023, available at: *https://archive.ph/UuND7*; Serhiy Reznik, 'This night, the Russian barbarians launched an aerial attack with drones, several Shaheds hit a critical infrastructure object in the city', 18 March 2023, available at: *https://archive.ph/orfTS*.

96 Serhiy Lysak, 'That night, the Russian army attacked Dnipropetrovsk region with drones, probably "Shaheds"', 18 March 2023, available at: *https://archive.ph/UuND7*.

97 General Staff of the Armed Forces of Ukraine, 'Operational information as of 6:00 on 18.03.2023 regarding the Russian invasion', 18 March 2023, available at: *https://archive.ph/gN8hz*.

On the night of 22 March 2023, Russian forces attacked Kyiv Oblast and Zhytomyr Oblast with 21 Shahed-136/131 UAVs.[98] In Rzhyshchiv, Kyiv Oblast, the UAVs hit a school and two adjacent dormitories.[99] [100] Nine people were killed,[101] and 29 more were injured, according to local officials.[102] The attack partially destroyed one of the school buildings and the two dormitories, causing a massive fire.[103] As a result of the attack and the fire, more than 200 people had to be evacuated from the area.[104]

Source: Головне управління ДСНС України у Київській області

98   Air Force Command of UA Armed Forces, '"Shahed" attack from the North: 16 drones destroyed', 22 March 2023, available at: *https://archive.ph/PGArG*; Zhytomyrska ODA, 'Tonight, during a drone attack, three enemy drones were shot down by air defence units', 22 March 2023, available at: *https://archive.ph/2tubg*; Kyiv City Military Administration, 'Night air attack on the capital. Operational information', 22 March 2023, available at: *https://archive.ph/gL1gC*.

99   Coordinates of the impact sites: 49.965932798542696, 31.025156529844455.

100   The main department of the State Emergency Service of Ukraine in the Kyiv region, 'Work on the demolition of debris on the territory of the Rzhyshchiv Vocational Lyceum has been completed', 23 March 2023, available at: *https://kv.dsns.gov.ua/uk/ pres-centr/news/nadzvicaini-podiyi/roboti-po-rozboru-zavaliv-na-teritoriyi-rzishhivskogo-profesiinogo-liceiu-zaverseno*; Tsaplienko, 'Consequences of the attack in the Kyiv region', 22 March 2023, available at: *https://archive.ph/6jDGA*.

101   NV, 'Details of the night attack near Kyiv. Russia hit dormitories and a school in Rzhyshchiv, three dead persons, people under the rubble', 22 March 2023, available at: *https://archive.ph/zY8k5*; The main department of the State Emergency Service of Ukraine in the Kyiv region, 'Work on the demolition of debris on the territory of the Rzhyshchiv Vocational Lyceum has been completed', 23 March 2023, available at: *https://kv.dsns.gov.ua/uk/pres-centr/news/nadzvicaini-podiyi/roboti-po-rozboru-zavaliv-na-teritoriyi-rzishhivskogo-profesiinogo-liceiu-zaverseno* ; The main department of the State Emergency Service of Ukraine in the Kyiv region, 'At 12:52 on 23 March, work on the demolition of debris on the territory of the Rzhyshchiv Vocational Lyceum was completed', 23 March 2023, available at: *https://archive.ph/x0wEe*.

102   Andrii Nebytov, '9 dead persons, 9 injured and another 20 people were taken to the hospital with minor injuries', 23 March 2023, available at: *https://archive.ph/lEPMD*.

103   The main department of the State Emergency Service of Ukraine in the Kyiv region, 'Work on the demolition of debris on the territory of the Rzhyshchiv Vocational Lyceum has been completed', 23 March 2023, available at: *https://kv.dsns.gov.ua/uk/ pres-centr/news/nadzvicaini-podiyi/roboti-po-rozboru-zavaliv-na-teritoriyi-rzishhivskogo-profesiinogo-liceiu-zaverseno*.

104   Suspilne.Media, 'The rescuers finished dismantling the rubble in Rzhyshchiv. What is known about the Shahed attack on Kyiv and the Kyiv region', 23 March 2023, available at: *https://archive.ph/Vwzu1*; Andrii Nebytov, 'Three people died, 7 people were injured as a result of drones hitting a dormitory building in one of the districts of Kyiv region', 22 March 2023, available at: *https://archive.ph/KMfPN*.

Case Study No. 10

24

DATE: 19–20 APRIL 2023
LOCATION: ODESA
INCIDENT: ATTACK ON A CHILDREN'S SUMMER CAMP

On the night of 20 April 2023, Russian forces attacked Odesa with 12 UAVs.[105] Two drones targeted a children's summer camp, causing a fire in one of its buildings.[106] [107]

Odesa District Military Administration and Ukrainian air defence confirmed the use of the Shahed-136 UAVs,[108] the remnants of which were found at the impact site.[109]

Sources: https://t.me/odesacityofficial/16526; Operational Command "South" Facebook page

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105   Odesa District Military Administration, 18 April 2023, available at: *https://archive.ph/Busmp*; Hromadske, 'The night attack of Odesa by "Shakheds" was aimed at detecting air defense - Humenyuk', 19 April 2023, available at: *https://archive.ph/W5CwC*

106   Coordinates of the impact site: 46.37653580320062, 30.73649621962206

107   Operational Command "South", 'At night, the enemy attacked Odesa with Shahed-131/136 kamikaze drones', 18 April 2023, available at: *https://archive.ph/LWuoA*

108   Odesa District Military Administration, 18 April 2023, available at: *https://archive.ph/Busmp*; Air Command "South", 'Ten "Shahed-136/131" Destroyed In The Sky over Odesa region', available at: *https://archive.ph/q8ry3*

109   Odesa.Officially, 'Consequences of a nighttime hit to a recreational infrastructure facility in Odesa', 19 April 2023, available at: *https://archive.ph/QZHQy*

Potential legal classification

The ten cases of Russian attacks on Ukrainian civilian and energy infrastructure analysed above are part of the broader pattern of Russian forces' intentional terror campaign against the Ukrainian population.

An attack on civilian infrastructure can only be justified if it is proved to represent a concrete military advantage.[110] Even where a military objective is identified, the attack's lawfulness is a question of proportionality – measured by pitting the concrete military advantage being sought against the harm that the attack causes to the civilian population. Where harm is disproportionate to the advantage being sought, the attack violates IHL[111] and may amount to a war crime.[112]

The Russian High Command has claimed that its attacks on civilian infrastructure are aimed against the "military command system of Ukraine and related energy facilities".[113]

The Ukrainian government,[114] Ukrainian army representatives,[115] and national[116] and international military experts[117] have said however that the Ukrainian Armed Forces are energy-autonomous and the Russian attacks on Ukrainian energy infrastructure do not affect either Ukrainian military capacity or its progress/advances on the battlefield. Thus, Russian attacks on Ukrainian energy infrastructure provide the Russian armed forces with very little, if any, military advantage.

As of February 2023, Russian forces have attacked some 250 energy facilities,[118] mostly cogeneration plants and electricity substations,[119] leaving more than ten million households without power.[120] As of 31 January 2023, at least 116 civilians have been killed, and at least 379 more have been injured in

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110   Rule 14 of Customary IHL, available at: *https://ihl-databases.icrc.org/en/customary-ihl/v1/rule14*; Additional Protocol I, Article 57(2)(a)(iii); Marco Sassoli, International Humanitarian Law (Edward Elgar Publishing, 2019), 347, 360, 365.

111   Additional Protocol I, Article 51(5)(b), Article 57(2)(a)(iii), Article 85(3)(a).

112   ICC Statute, Article 8(2)(b)(iv).

113   Ministry of Defence of Russia, statement of 18 November 2022, available at: *https://t.me/mod_russia/21855*.

114   Ukraine Government Portal, Operational update regarding the russian invasion as of 06:00, on October 11, 2022, 11 October 2022, available at: *https://www.kmu.gov.ua/news/operatyvna-informatsiia-heneralnoho-shtabu-zbroinykh-syl-ukrainy-stanom-na-0600-11102022-shchodo-rosiiskoho-vtorhnennia*

115   Deputy Ministers of Defense, Hanna Malya, 'The vast majority of enemy missile strikes have recently been aimed at energy infrastructure facilities', 23 November 2022, available at: r*https://t.me/annamaliar/447*

116   Focus, 'Strikes on the power system: at the front, they know how to act - an expert', available at: *https://focus.ua/uk/voennye-novosti/534133-udary-po-energosisteme-na-fronte-znayut-kak-deystvovat-expert*

117   The Guardian, Kremlin decision to target Ukraine's cities was political, not tactical Dan Sabbagh Defence and security editor, 10 October 2022, available at: *https://www.theguardian.com/world/2022/oct/10/kremlin-decision-to-target-ukraines-cities-was-political-not-tactical* ; NYT, Kremlin decision to target Ukraine's cities was political, not tactical Dan Sabbagh Defence and security editor, 10 October 2022, available at: *https://www.nytimes.com/2022/10/10/world/europe/russia-missiles-ukraine-civilians.html*; NTA, 'The main missile terror of Russia will begin when the real cold comes. Analyst Ihal Levin', 1 November 2022, available at: *https://www.nta.ua/golovnyj-raketnyj-teror-rosiya-mozhe-pochaty-koly-pryjde-spravzhnij-holod-analityk-igal-levin/*

118   CNN, 'Putin's power play. Inside Russia's plot to plunge Ukraine into darkness, and how Ukrainians have survived', 24 February 2023, available at: *https://www.cnn.com/interactive/2023/02/europe/putin-ukraine-energy-infrastructure-attack/index.html*

119   OHCHR, Report on the Human Rights Situation in Ukraine, 24 March 2022–31 January 2023, 24 March 2023, p. 11, available at: *https://www.ohchr.org/sites/default/files/documents/countries/ukraine/2023/23-03-24-Ukraine-35th-periodic-report-ENG.pdf* ; *https://www.cnn.com/interactive/2023/02/europe/putin-ukraine-energy-infrastructure-attack/index.html*

120   Human Rights Watch, "Ukraine: Russian Attacks on Energy Grid Threaten Civilians", 6 December 2022, available at: *https://www.hrw.org/news/2022/12/06/ukraine-russian-attacks-energy-grid-threaten-civilians*.

these attacks.[121] Without electricity, water and fuel, hundreds of healthcare facilities were unable to operate to their full capacity[122] and the power outages posed severe risks to the lives of their patients, especially those dependent on electric life-support machines.[123] As a result of Russian attacks on critical infrastructure, millions of people were at times deprived of access to clean water, heating and the ability to cook hot meals.[124]

In addition to energy infrastructure, Russian armed forces have targeted residential buildings, a school, a children's summer camp and a delivery business, which on the face of it, are not of any military value. These attacks have claimed 14 civilian lives and injured at least another 36.

Comments by the Russian leadership and state propaganda illustrate that the attacks have aimed to terrorise the civilian population, retaliate against Ukrainian counter-attacks and put pressure on Ukrainian authorities to abandon their resistance. According to President Putin, attacks on the energy infrastructure will be "commensurate with the level of threat to the Russian Federation".[125] His press secretary later clarified that the attacks are part of Russia's negotiation tactics, adding: "The unwillingness of the Ukrainian side to settle the problem, to start negotiations, its refusal to seek common ground – this is their consequence".[126] Members of the Russian parliament were more candid, calling on Ukrainian civilians to "rot and freeze"[127] and describing the attacks as "necessary to destroy the Ukrainian state's capacity to survive".[128] Consequently, there is a reasonable basis to believe that these attacks are aimed not at a substantial military advantage but at the civilian population. At the very least, the Russian attacks cause disproportionate harm to the civilian population to the military advantage being sought – harm which the Russian military and civilian leadership appear to disregard and even encourage.

IHL prohibits violence or threats, "the primary purpose of which is to spread terror among the civilian population."[129] Such tactics are also prohibited by the Russian Federation's Military Manual.[130]

The Shahed-136 is considered to be a guided weapon. It navigates using a combination of GPS and GLONASS, while a commercial-grade digital communication chip within it allows for a target's location to be updated mid-flight, or even for the intended target to be changed entirely while still in the air.

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121   OHCHR, Report on the Human Rights Situation in Ukraine, 24 March 2022–31 January 2023, 24 March 2023, p. 11, available at: *https://www.ohchr.org/sites/default/files/documents/countries/ukraine/2023/23-03-24-Ukraine-35th-periodic-report-ENG.pdf*

122   Statement by Dr Hans Henri P. Kluge, WHO Regional Director for Europe, 'Winter in Ukraine: people's health cannot be held hostage', 21 November 2022, available at: *https://archive.ph/PICjW*.

123   Human Rights Watch, 'Ukraine: Russian Attacks on Energy Grid Threaten Civilians', 6 December 2022, available at: *https://archive.ph/TI05Z*.

124   *Ibid.*

125   Russian President Vladimir Putin's public speech after 10 October 2022 mass attacks on Ukrainian energy infrastructure available at: *https://archive.ph/l0ZuU* .

126   The Moscow Times, "Civilians suffering as a 'Consequence' of Kyiv's Refusal to Negotiate", 17 November 2022, available at: *https://archive.ph/dAeXX*

127   Francis Scarr, [@francis_scarr], I missed this last week: Russian MP Boris Chernyshov (who's also one of the Duma's deputy speakers) celebrating the "holy hatred" of missile strikes on Ukraine's critical infrastructure and calling for ordinary Ukrainians to "freeze and rot" in their homes, Twitter, 26 November 2022, available at: *https://archive.ph/dhvTB*

128   Francis Scarr, [@francis_scarr], Russian MP Andrei Gurulyov says his country will "finish off" Ukraine's power grid and then target its banking system "If we bomb the centre of their banking operations, they won't be able to transfer anything anywhere, cards won't work and people won't get their paychecks", Twitter, 28 November 2022, available at: *https://archive.ph/6IOK5*

129   Article 51(2) of Additional Protocol I; Article 33 of Geneva Convention IV.

130   Russian Federation, Instructions on the Application of the Rules of International Humanitarian Law by the Armed Forces of the USSR, Appendix to Order of the USSR Defence Minister No. 75, 1990, § 5(n).

Targets are selected and struck with precision, and it is therefore reasonable to assume that the case studies show the Shahed-136 impacting its intended and premeditated target, rather than experiencing any level of deviation.

In conclusion therefore, the Russian attacks on eight energy infrastructure objects across seven Ukrainian regions, ten residential buildings in Novomoskovsk, an office in Kyiv, a school in Rzhyshchiv, a children's summer camp in Odesa and a delivery business in Dnipro, on the face of it, represent grave breaches of IHL[131] and may amount to the war crime of directing attacks against protected civilian objects.[132]

Additionally, Russian attacks on some of these objects, particularly, energy infrastructure in Dnipropetrovsk and Vinnytsa regions, an apartment building in Kyiv, two dormitories in Rzhyshchiv and a delivery business in Dnipro, which left 15 civilians dead and 42 more injured may amount to the war crime of directing attacks against civilians.[133]

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131   Additional Protocol I, Article 85(3)(a).

132   ICC Statute, Article 8(2)(b)(ii). The attack on a school in Rzhyshchiv should be additionally qualified as an attack on specially protected object under Article 8(2)(b)(ix).

133   ICC Statute, Article 8(2)(b)(i).

PART THREE:

THE SHAHED-136 AND ITS RELIANCE ON WESTERN COMPONENTS

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Usually given the name 'Geranium' inside Russia, the Shahed-136 is an Iranian-made 'one-way attack' (OWA) UAV, meaning each aircraft is used once to fly towards a designated target, detonating on impact. Amid Russia's ongoing difficulties maintaining high-tempo missile strikes, the Shahed-136 has proved a key weapon in its arsenal. It is believed to have a range of up to 2,500km, using a combination of Global Navigation Satellite System and GLONASS to reach its intended target, while its warhead, at between 40 and 50 kg, is effective against soft, unprotected targets.

Dr Uzi Rubin, the former Director of the Israel Missile Defense Organization, previously described the Shahed-136's "simplicity, combined with its almost uncanny accuracy, long range and low cost" as making it entirely unique as a strategic standoff weapon.

As RUSI has noted, this precision and range, combined with a small yet powerful warhead, renders the Shahed-136 for all practical purposes a "propeller-driven cruise missile".[134]

THE HESA SHAHED-136 AT A GLANCE	
Originated from	**Possessed by**
Iran	Iran, Russia
Alternative names	**Class**
Geran-2/Geranium-2 in Russian possession	Loitering munition
Guidance system	**Length**
GNSS, INS	3.5m
Basing	**Weight**
Rocket-assisted take-off	200 kg
Wingspan	**Range**
2.5 m	allegedly 2,500 km
Speed	**Engine**
185 km/h	MD550 / 3W motors
Payload	**In service**
≈50 kg	2019-2020
Status	
Operational	

The origin of the Shahed-136 is uncertain, but Iran has been employing drones in its military operations since the 1980s. In recent decades, a range of new UAVs have been exhibited during annual Iranian military parades and the country is known to manufacture several types of drones. It has been alleged

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134   Royal United Services Institute, 'Russia's Iranian Made UAVs: A Technical Profile', 13 January 2023, available at: *https://web. archive.org/web/20230324023542/https://rusi.org/explore-our-research/publications/commentary/russias-iranian-made-uavs-technical-profile*

that these drones are then supplied to various groups including Hezbollah in Lebanon and Houthi rebels in Yemen. According to the Pentagon, Iranian-allied forces have utilised these drones in attacks against US military personnel in Syria, including one such attack in August 2022 against the US-run base at Tanf.[135]

The Shahed-136, the most advanced of these drones, was first publicly named by Israel's Prime Minister Naftali Bennett in September 2021.[136] In July 2022, US National Security Advisor Jake Sullivan said the White House believed Iran was preparing to provide Russia with hundreds of drones, adding that Iran would also train Russian military personnel to use them.[137]

In October 2022, the United States National Security Council told reporters that "a relatively small number" of Iranian trainers and technicians were in Crimea "to help the Russians use [the drones] with better lethality." Russians remotely piloted the aircraft with Iranian personnel "assisting".[138]

While it is not known precisely how many Shahed-136s have been supplied to Russia, Ukraine's intelligence services have claimed that Russia ordered approximately 2,400 of the type.[139]

NAKO's analysis of two different Shahed-136s, downed in Odesa and Cherkasy in 2022, revealed them as having a range of Western components originating from the US, Japan, Canada, and Switzerland. The type of components found inside the Shahed-136 vary, but it's clear they provide a genuine and substantial contribution to its overall capability.

135   https://www.washingtonpost.com/world/2022/08/15/syria-tanf-drone-strike-us-base/

136   https://www.thenationalnews.com/world/2021/09/27/unga-2021-israeli-pm-attacks-iranian-drone-terror-swarms/

137   https://www.whitehouse.gov/briefing-room/press-briefings/2022/07/12/press-briefing-by-press-secretary-karine-jean-pierre-and-national-security-advisor-jake-sullivan/

138   https://www.washingtonpost.com/national-security/2022/10/20/russia-iran-kamikaze-drones/

139   https://mil.in.ua/en/news/russia-ordered-2-400-shahed-136-kamikaze-uavs-from-iran/

Companies whose components have been found inside the Shahed-136:

COUNTRY	COMPANY	COMPONENT
USA	Adesto Technologies	SPI Serial Flash Memory with Dual-I/O and Quad-I/O Support
	Analog Devices	RF Transceivers
		ADI 12-Output Clock Generators with 2.8GHz VC
		Linear CMOS regulators with low drop
		16-bit analog-to-digital converters
		Output voltage/current drivers with output signal range
	Freescale Semiconductor	Microprocessor
	Hemisphere GNSS	Unidentified semiconductor
	Hitec USA Group	High Voltage Giant Torque Servo
	International Rectifier	Integrated circuit, buffer/line driver
	Marvell Technology	Ethernet Transceivers
	Maxim Integrated	Multichannel RS-232 Line Drivers and Receivers
	Micrel Semiconductor	Low dropout linear regulators
	Micron Technology	Parallel NOR Flash Memory
		Multilayer ceramic chip capacitor
	MinMax Technology	Non-Isolated DC/DC Converter
	ON Semiconductor	High speed CMOS octal bus buffer
	Texas Instruments	Instrumentation amplifiers
		Microcontrollers
		Digital signal processors
		Dual output low dropout voltage regulators
		3- to 5.5-V single channel RS-232 line driver/receiver
		Dual-channel low-dropout voltage regulators
		Power modules
Japan	Murata Manufacturing	Integrated circuits
		Point-of-load converters
		EMI/RFI Filters
		Non-Isolated DC/DC Converters
Canada	Tallysman	GLONASS, GPS Ceramic Patch RF Antenna
Switzerland	STMicroelectronics	Microcontrollers
		Linear regulators

All companies named above were invited to respond to concerns around the supply of their products to Russia and Iran.

SPI Serial Flash Memory with Dual-I/O and Quad-I/O Support manufactured by Adesto Technologies.

A range of components manufactured by Analog Devices, including:

- *RF Transceivers*
- *ADI 12-Output Clock Generators with 2.8GHz VC*
- *Linear CMOS regulators with low drop*
- *16-bit analog-to-digital converters*
- *Output voltage/current drivers with output signal range*

A spokesperson for **Analog Devices** said: *"As a global public company, Analog Devices is committed to complying with all applicable laws and regulations in the countries where we operate.*

"Following Russia's invasion of Ukraine, and in compliance with U.S. and EU sanctions, Analog Devices ceased business activities in Russia, and in the Russian-backed regions of Ukraine and Belarus, and promptly instructed all of our distributors to halt shipments of our products into these regions. Any post-sanctions shipment into these regions is a direct violation of our policy and the result of an unauthorized resale or diversion of ADI products."

Microprocessors manufactured by Freescale Semiconductor, an American company now owned by NXP Semiconductors.

A spokesperson for **NXP Semiconductors** said: *"We do not tolerate the use of our products in Russian or Iranian weapons, or any other application our products were not designed or licensed for. We continue to comply with export control and sanctions laws in the countries where we operate and we*

do not support any business in or with Russia, Belarus, and other fully embargoed countries, including Iran. Our team is in ongoing contact with regulators around the world on this issue, as we explore additional measures to help neutralize illegal chip diversion."

Micro-components made by Hemisphere GNSS, a US manufacturer based in Arizona.

A High Voltage Giant Torque Servo, a form of ultra-precise and efficient electrical motor, manufactured by Hitec USA Group.

Buffer line driver manufactured by International Rectifier, now part of Infineon.

Our previous report – 'Enabling War Crimes? Western-Made Components in Russia's War Against Ukraine' – identified components bearing the name of Cypress Semiconductor, another company that has been acquired by Infineon, inside the Iskander, Kh-101, and Kalibr missiles.

Ethernet transceivers, allowing for point-to-point network and data transfer, manufactured by Marvell Technology. Components bearing the name of Marvell have previously been identified in Russia's Kalibr cruise missile.

A spokesperson for **Marvell** said: *"Marvell is appalled that any of its products are used in Russian weapons. Marvell does not sell to the Russian military or government. We have a strong export compliance program and have no knowledge how these parts have found their way into Russia."*

Multichannel RS-232 Line Driver/Receiver manufactured by Maxim Integrated.

Low dropout linear regulators manufactured by Micrel Semiconductor, now owned by Microchip Technology.

Microchip said: *"Microchip does not sell products into countries where our technology is prohibited from sale such as Iran, Russia, Belarus, or sanctioned regions in the Ukraine. We condemn the illegal use of our products. We take our responsibility as a good corporate citizen seriously, and comply with applicable laws, including export controls and trade sanctions. We take care to maintain supply chain integrity by various methods including screening customers against restricted party lists. We also partner with government authorities and law enforcement, as necessary.*

Microchip is a leading provider of smart, connected, and secure embedded control solutions with more than 120,000 customers across the industrial, automotive, consumer, aerospace and defense, communications, and computing markets. Our products have many possible customer applications. Distributors also sell our products into the marketplace.

Diversion of legally sold products is an industry-wide issue. Microchip is participating in a U.S. Industry Working Group led by the U.S. Department of Commerce Bureau of Industry and Security to further discuss these matters. For more information, see the Semiconductor Industry Association (SIA) statement titled **Semiconductor Industry is Committed to Combatting Illicit Chip Diversion***. Microchip is a member of SIA and our CEO is on the SIA board of directors."*

Parallel NOR flash memory and multilayer ceramic chip capacitors manufactured by Micron Technology.

The Shahed-136's airspeed sensor board containing non-isolated DC/DC converters manufactured by MinMax Technology. The presence of MinMax components in Iranian military equipment was previously reported by Atlantic Council in 2020.

High speed CMOS octal bus buffer manufactured by ON Semiconductor.

A range of microcontrollers, digital signal processors, instrumentation amplifiers, power modules and voltage regulators manufactured by Texas Instruments. Components manufactured by Texas Instruments have previously been identified within the Iskander, Kh-101, and Kalibr missiles.


A spokesperson for **Texas Instruments** said: ***"TI is not selling any products into Russia, Belarus or Iran. TI stopped sales to Russia and Belarus at the end of February 2022, and we no longer support sales there. TI complies with applicable laws and regulations in the countries where we operate. We do not support or condone the use of our products in applications for which they weren't designed."***

EMI/RFI filters manufactured by Murata.

GLONASS, GPS Ceramic Patch RF Antenna manufactured by Tallysman.
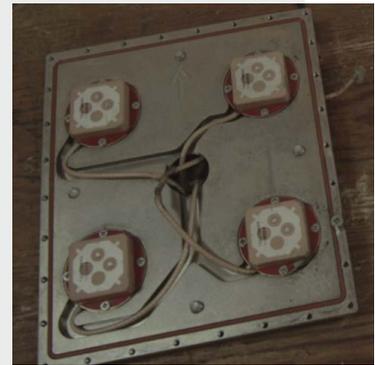
A spokesperson for **Tallysman** said: *"We were made aware and agree that some of our components have been misused in sophisticated military guidance systems in Ukraine. Tallysman is 100% committed to supporting Ukraine in the face of Russian aggression. Tallysman produces GNSS (also known as GPS) patch elements, that are highly desired globally for positioning, navigation, and timing systems. The Tallysman ceramic patch antennas recovered are typical of what can be found in a consumer Satnav device. They are normally used for survey equipment, precision agriculture, timing systems, fleet management, and many other applications. Tallysman has been and will continue to be fully compliant and cooperative with all Canadian and international agencies and export controls. Unfortunately, products like antennas, printed circuit boards, semiconductors, resistors, capacitors, screws, wires, etc., with significant engineering effort can be used for malevolent purposes and unintended applications. To the extent possible for a product sold globally, we examine and review end customer identities and intended end uses. We are hyper vigilant about what products we sell to whom."*

Microcontrollers and linear regulators manufactured by STMicroelectronics.

RECOMMENDATIONS

RECOMMENDATIONS

As detailed throughout this report, the Shahed-136, containing Western-made components, has been used to carry out what are suspected to be war crimes in Ukraine. The supply and maintenance of Russia's weapons is a key vulnerability in its campaign against Ukraine, and it is the duty of policymakers and businesses to exploit this vulnerability.

In light of this report's findings, the authors offer the following recommendations:

1. **Sanctions and embargoes:** Countries should consider implementing further targeted sanctions or embargoes on specific individuals, entities, or sectors involved in the transfer of Western components to Russia's military-industrial complex. These measures should be implemented in coordination with like-minded countries to maximise their impact.

   Moreover, it is clear that such sanctions require greater monitoring and enforcement in order to truly be effective. This is an area where governments can cooperate effectively with civil society, NGOs, and think tanks. Western companies and NGOs have easily available open-source intelligence tools at their fingertips, whether they are commodity trading platforms or automatic identification system-based vessel tracking websites. These tools empower watchdog organisations and risk assessment committees in governmental and non-governmental organisations to monitor malign transfers of products and technologies that would undermine sanctions efficacy.

2. **Strengthen export controls:** Countries should enhance their export control mechanisms and regulations to restrict the transfer of sensitive military technology and components to Russia. This includes stricter scrutiny of export licences and a comprehensive review of end-user certificates. These countries should also study the supply chain to prevent the export of Western components from third countries to Russia.

3. **Company due diligence:** Companies must exercise greater diligence in assessing the ultimate purpose for which their products are utilised, as emphasised in *the United Nations Guiding Principles on Business and Human Rights*. It is strongly recommended that companies carefully consider the conclusions presented in these reports and acknowledge the possible material risks associated with future products.

For companies engaged in cross-border transactions involving items that are restricted under Russia-related export controls, it is prudent to implement a compliance policy reasonably designed to prevent, deter, and detect violations. Such a policy and related procedures should cover:

- Screening of counterparties against U.S. sanctions- and export control-related restricted party lists;
- Identification of export-controlled products and implementation of related internal controls;
- Training of employees; and
- Periodic testing of the functionality of the compliance program.[140]

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140   TechCrunch, Western sanctions against Russia: Tips for tech companies managing compliance risk, 08 May 2023, available at: *https://techcrunch.com/2023/05/08/western-sanctions-against-russia-tips-for-tech-companies-managing-compliance-risk/*

Regarding third-party diversion risk in particular, companies can take the following steps:

- Conduct reasonably robust due diligence on third parties such as resellers, distributors, and sales agents;

- Obtain from counterparties "end-user certificates," confirming the intended end-use and end-user of the products;

- Incorporate compliance-related terms into contracts with counterparties; and

- Conduct periodic audits of sales/distribution channels.[141]

Ignorance as to a product's end-user should not be relied upon as a moral or legal defence.

4. **Diplomatic efforts:** An international, and solution-focused conversation to examine ways in which the flow of western-made components can be ceased. Governments, political leaders, and businesses alike have a duty to engage with this conversation and explore solutions.

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141   TechCrunch, Western sanctions against Russia: Tips for tech companies managing compliance risk, 08 May 2023, available at: *https://techcrunch.com/2023/05/08/western-sanctions-against-russia-tips-for-tech-companies-managing-compliance-risk/*

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NAKO

The Independent Anti-Corruption Commission (NAKO) is a voluntary, non-profit, non-partisan organisation pursuing the goals of minimising opportunities for corruption in Ukraine's defence sector through strong research, effective advocacy, and increased public awareness. NAKO was established as a program of the Transparency International Defence and Security program in 2016 and since then has evolved as a self-standing organisation within the Transparency International global movement.

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TRUTH HOUNDS

Truth Hounds is a team of experienced human rights professionals documenting war crimes and crimes against humanity in conflict contexts since 2014. Truth Hounds fights against impunity for international crimes and grave human rights violations through investigation, documentation, monitoring, advocacy and problem solving for vulnerable groups. Truth Hounds documenters mobilise all available resources and documentation methodology to create a systemic approach to its documentation work, and promote accountability for grave human rights abuses and international crimes.

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