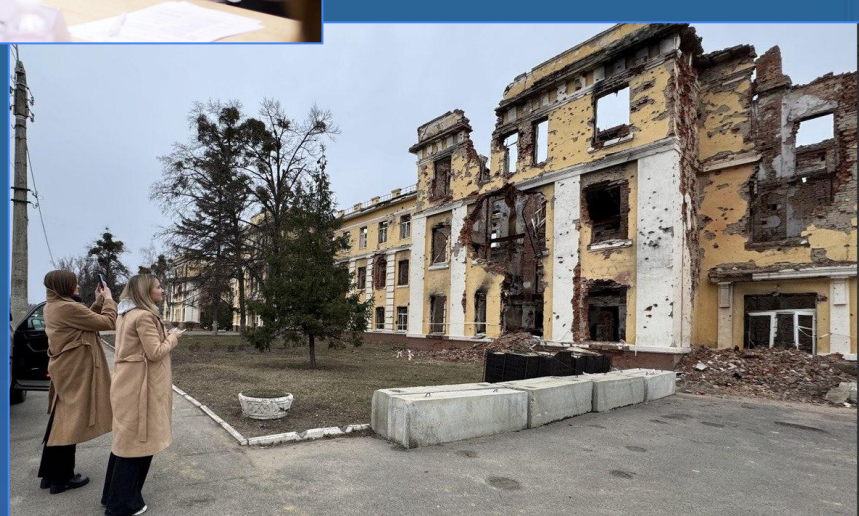


# Debris management in Ukraine







# DEBRIS



**KHARKIV**



**MYKOLAIV**



**KHERSON**



**ODESA**



**SUMY**



**CHERNIHIV**





670 000 tons



**But is that  
actually true?**

# Waste generation norm per 1 m<sup>2</sup> of building area for multi-storey residential buildings

## 5-storey brick multi-apartment buildings

Concrete (concrete and reinforced concrete structures and elements, their fragments; mineral (cement-sand, gypsum, lime, etc.) and polymer-cement masonry and finishing (plastering, decorative) mortars), t/sq.m	Wood, t/sq.m	Brick (brick debris), t/sq.m	Metals, t/sq.m	Window and door units, glass, t/sq.m	Total rate, t/sq.m
1,556	0,063	0,840	0,0310	0,0088	2,499

## 5-storey brick multi-apartment buildings in case of fire

Concrete (concrete and reinforced concrete structures and products, their fragments; mineral-based mortars (cement-sand, gypsum, lime, etc.); polymer-cement masonry and finishing mortars (plastering, decorative)), t/sq.m	Wood, t/sq.m	Brick (brick debris), t/sq.m	Metals, t/sq.m	Window and door units, glass, t/sq.m	Total rate, t/sq.m
1,556	-	0,840	0,0310	0,0088	2,436

For buildings or their parts that have been affected by fire, the estimated amount of demolition waste is calculated separately based on waste generation rates applicable in the event of fire damage..



# ESTIMATION OF THE AMOUNT OF DEMOLITION WASTE BY MAIN COMPONENTS



The amount of demolition waste generated in **multi-apartment residential buildings**, school and preschool institutions, as well as healthcare facilities, is determined using the following formula:

$$M_i = S_i * a_i$$

**M** - Total amount of demolition waste generated at the i-th multi-apartment housing site, t;

**S** - Total destruction area of the i-th site, sq.m;

**a** - The demolition waste generation rate at the i-th site, t/sq.m, is determined according to Annex 2.

# Example of Calculation

## An apartment building partially destroyed



Standard building project 121-176-4.84.

The building is a 16-storey large-panel apartment block with 111 apartments.

Building footprint area – 614 sq.m.

Total floor area – 5,839.73 sq.m.

**One section of the building has been destroyed, with a destruction area of 2,910.87 sq.m.**

Concrete	Brick	Wood	Metals	Window and door units, glass	Total waste mass
$2,081 \times 2\,910,87$ $= 6\,057,52 \text{ т}$	$0,028 \times 2\,910,87$ $= 81,51 \text{ т}$	$0,053 \times 2\,910,87$ $= 154,23 \text{ т}$	$0,0608 \times 2\,910,87$ $= 176,98 \text{ т}$	$0,0087 \times 2\,910,87$ $= 25,32 \text{ т}$	$2,232 \times 2\,910,87$ $= 6\,497,06 \text{ т}$



# Online Calculator for Estimating Demolition Waste Volumes



## Розрахункова кількість відходів від руйнувань

Оберіть тип будівлі \*

Оберіть зі списку

Оберіть вид будівлі

Оберіть зі списку

Оберіть кількість поверхів

Оберіть зі списку

Загальна площа руйнування/площа забудови \*

Загальна площ.

☐ У будівлі була пожежа

☐ У будівлі використані азбестовмісні матеріали

Розрахувати

### Розрахунок:

Загальна маса відходів від руйнувань:	2842.548
Основні компоненти:	2797.958
Бетон	2611.69
Цегла	49.68
Деревина	70.07
Метали	54.78
Віконні та дверні блоки, скло	11.72
Супутні компоненти:	44.59
Деревина	17.83
Електронне	5.09
Метали	6.37
Біо	1.27
Інші	14.01





BEFORE

