

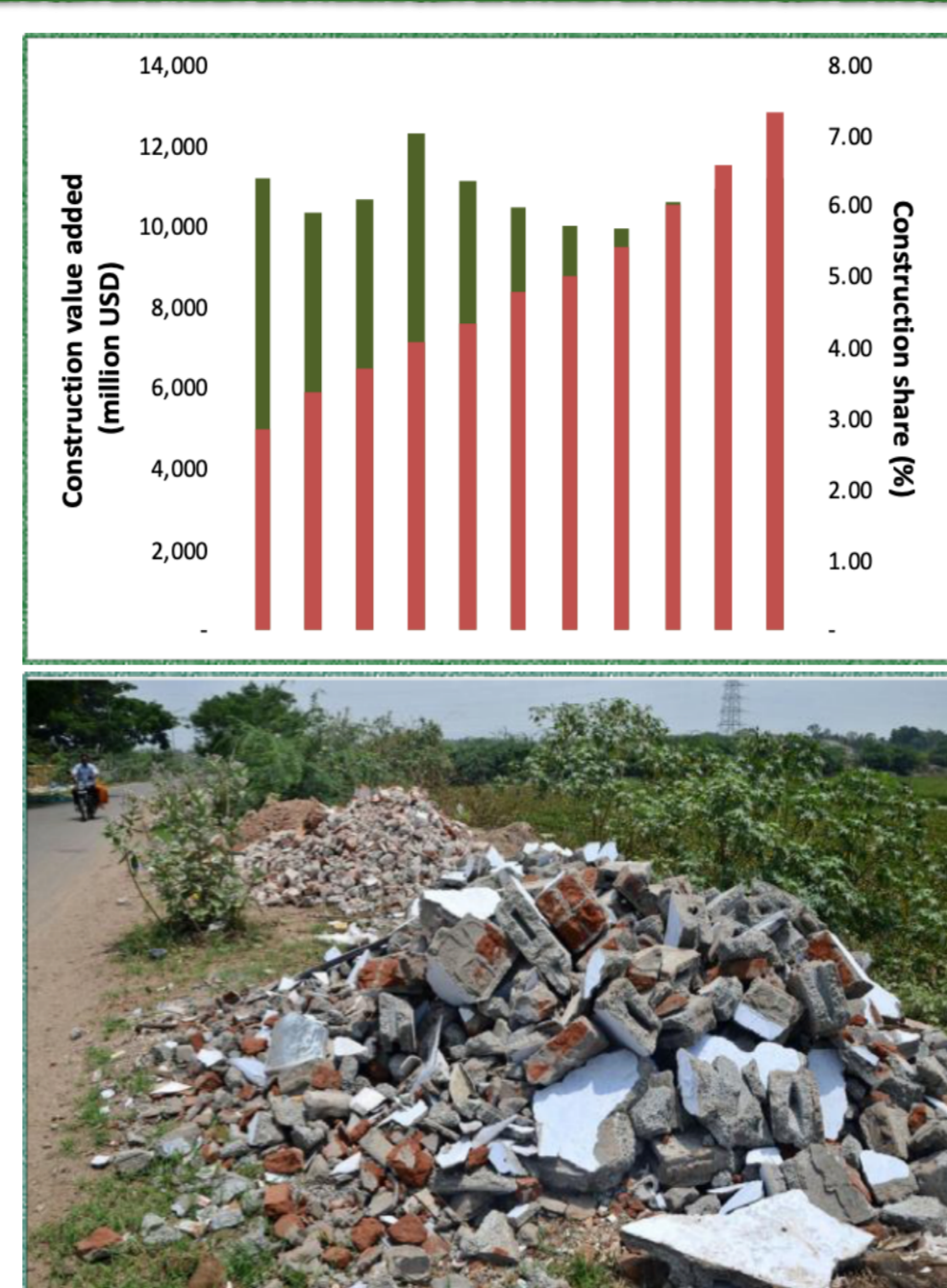
Construction and Demolition Waste in Hanoi, Vietnam: Generation, Composition and Handling Practices

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INTRODUCTION

- Construction industry plays an important role in the Vietnamese economy.
- A significant amount of construction and demolition waste (CDW) has been generated, leading to various issues in environmental quality and human health.
- Current practices of CDW handling and management are not well understood in Vietnam.

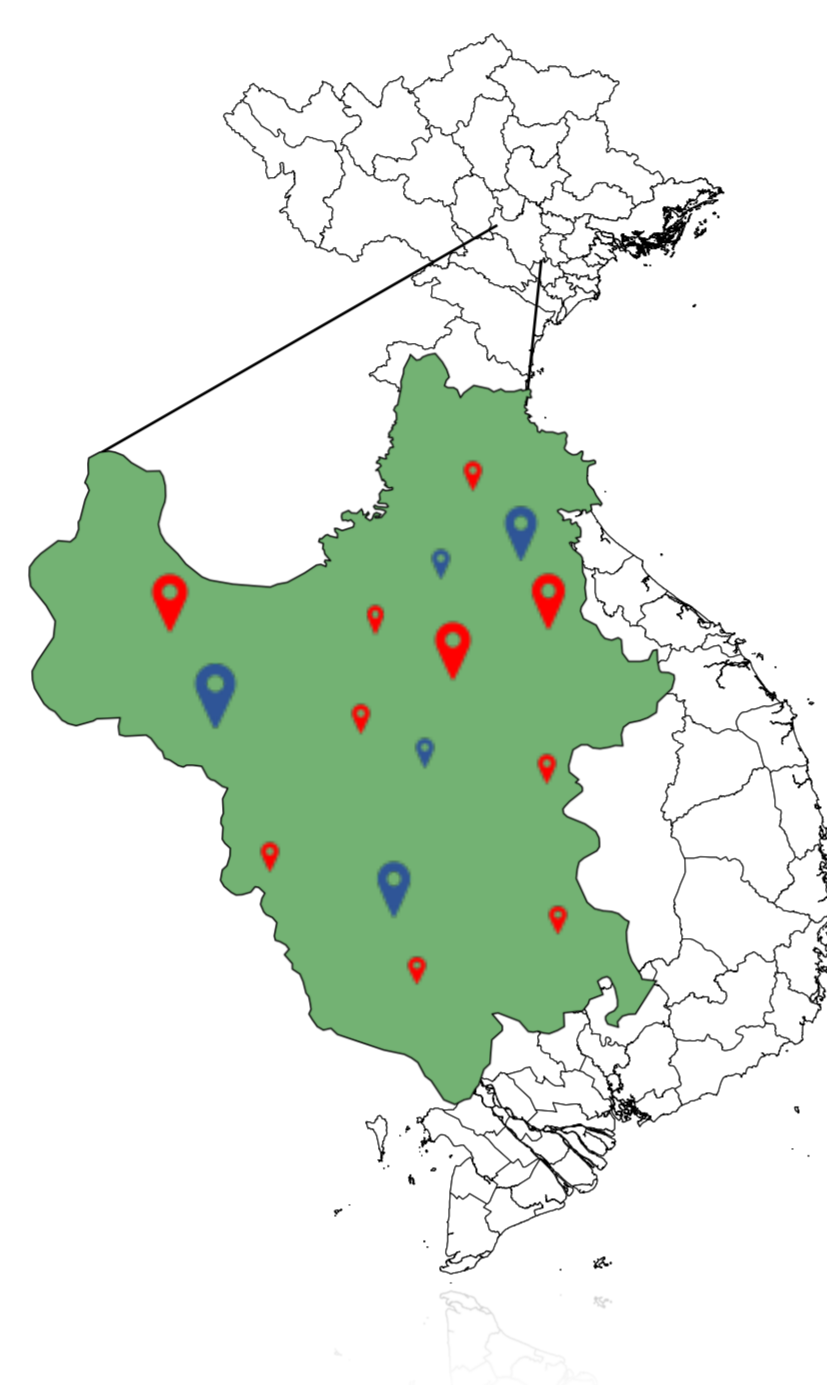


OBJECTIVES

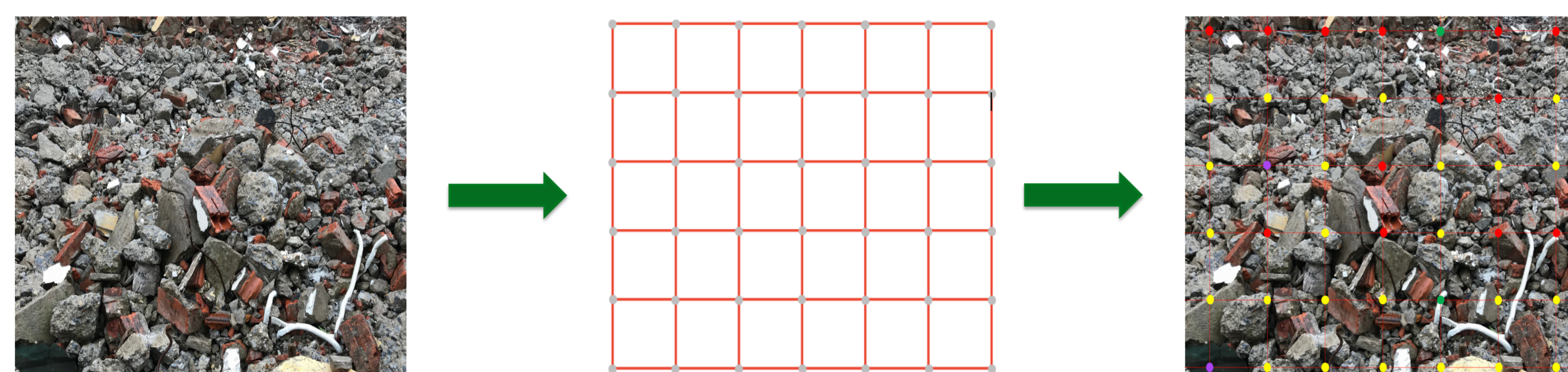
- To provide a better understanding of CDW management in Vietnam:
 - To estimate CDW generation rate per floor area
 - To identify CDW composition
 - To identify CDW typical handling practices

METHODOLOGY

No.	Survey site category	Pilot survey	Total number of sites surveyed
1	Construction of small buildings	1	2
2	Construction of large buildings	1	3
3	Demolition of small buildings	1	7
4	Demolition of large buildings		3
5	Road construction		3
6	River improvement		1
Total		3	19



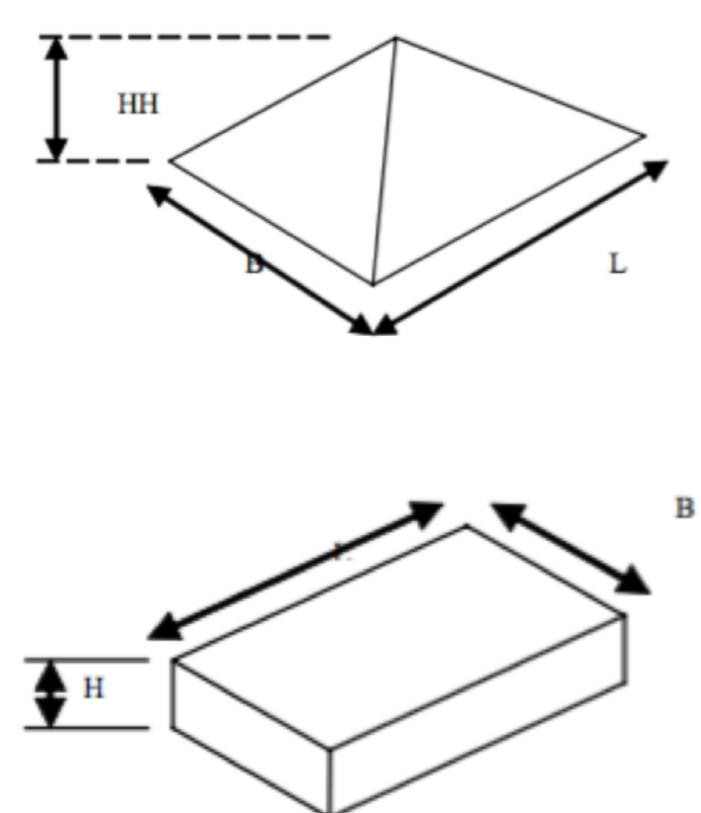
CDW composition: Image analysis



	Batch 1			Batch 2		
	Prepared comp. data	IA comp. (pile)	IA comp. (stockpile)	Prepared comp. data	IA comp. (pile)	IA comp. (stockpile)
Brick	20.7	17.8	25.9	21.4	19.6	24.9
Concrete	78.3	77.8	68.1	77.8	77.1	72.5
Metal	0.476	0.506	3.23	0.441	1.24	0.588
Plastics	0.181	2.54	1.98	0.167	1.73	1.66
Wood	0.309	1.36	0.705	0.287	0.347	0.358
Correlation		0.998	0.994	0.999	0.998	
Sig. (α)		0.000	0.001	0.000	0.000	

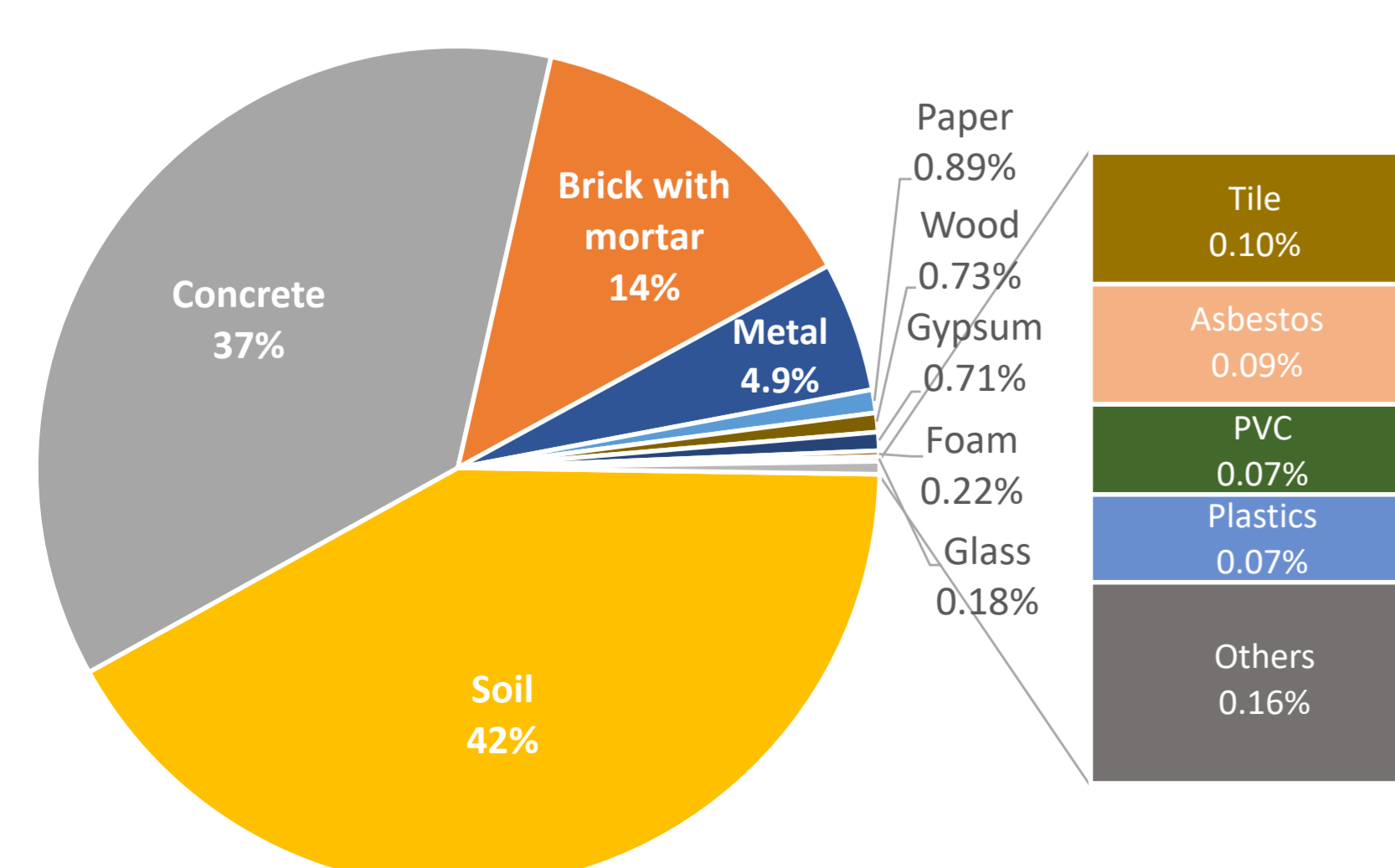
CDW quantification: Waste layout measurement

- Stockpiled waste: $V = (L \times B \times H) / 3$
- Gathered waste: $V = L \times B \times H$
- V: Volume; L: Length; B: Width; H: Height
- Waste quantity = Waste volume (m³) / (Storage duration (day)) × Bulk Density (kg/m³) × Construction/demolition duration
- Total CDW generated is estimated based on waste generation rates per construction/demolition floor area.



FINDINGS

CDW composition

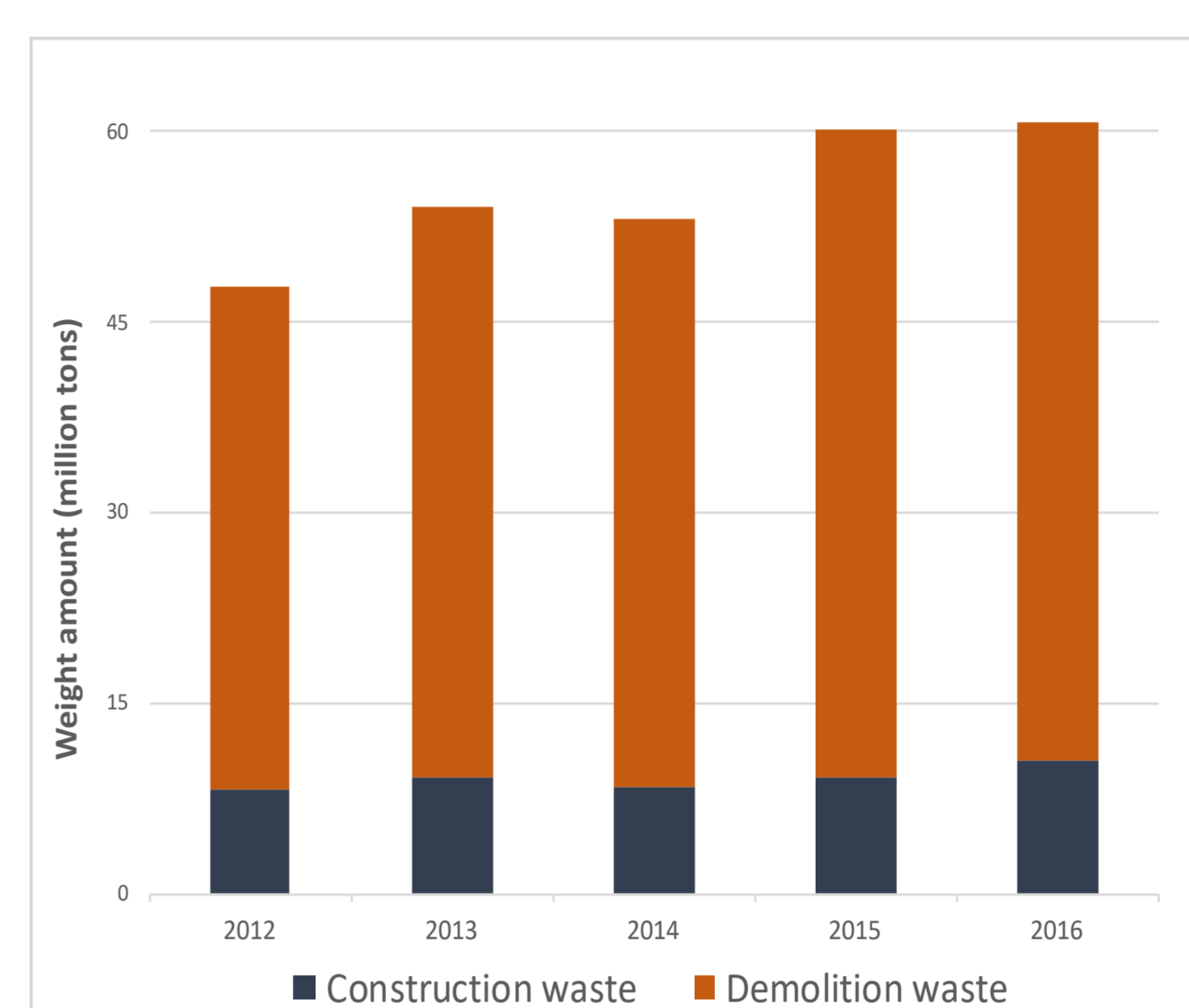


- Excavated soil, concrete and brick account for 90% of total CDW.
- Excluding soil, 80% of total CDW is concrete, brick and metal, consistent with building structure in Vietnam.

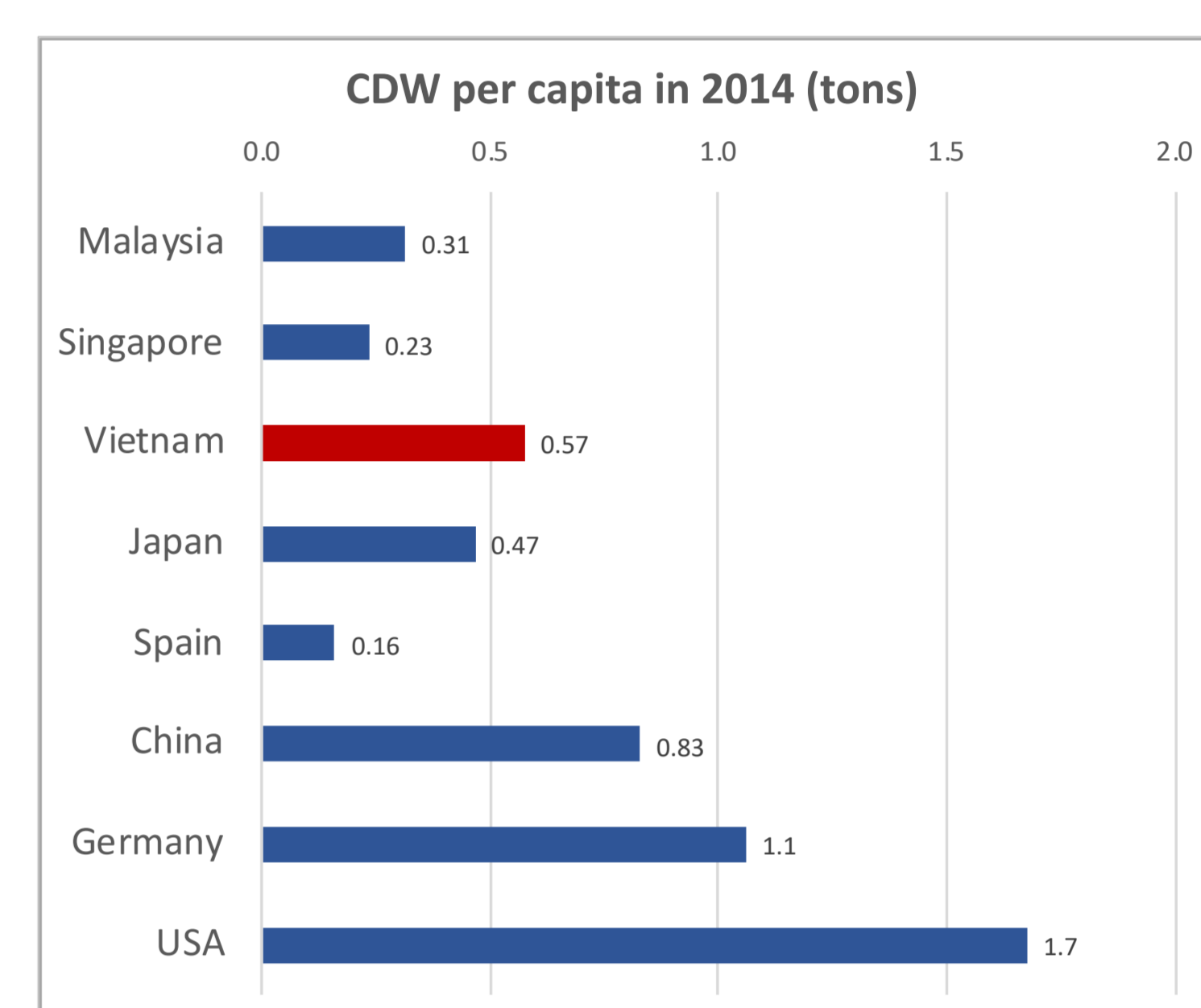
CDW generation rate (kg/m²)

Waste type	Small construction	Large construction	Small demolition	Large demolition
Brick with mortar	0.37	11	180	61
Concrete	2.9	63	350	200
Metal	2.1	2.7	47	38
Paper	0.45	26	0.42	3.2
Plastics	0.0083	10	2.2	3.0
Soil	72	850	5.0	-
Wood	0.041	37	9.4	5.8
Others	1.7	26	12	3.0
Total	79	1,027	610	318

Estimated CDW generation

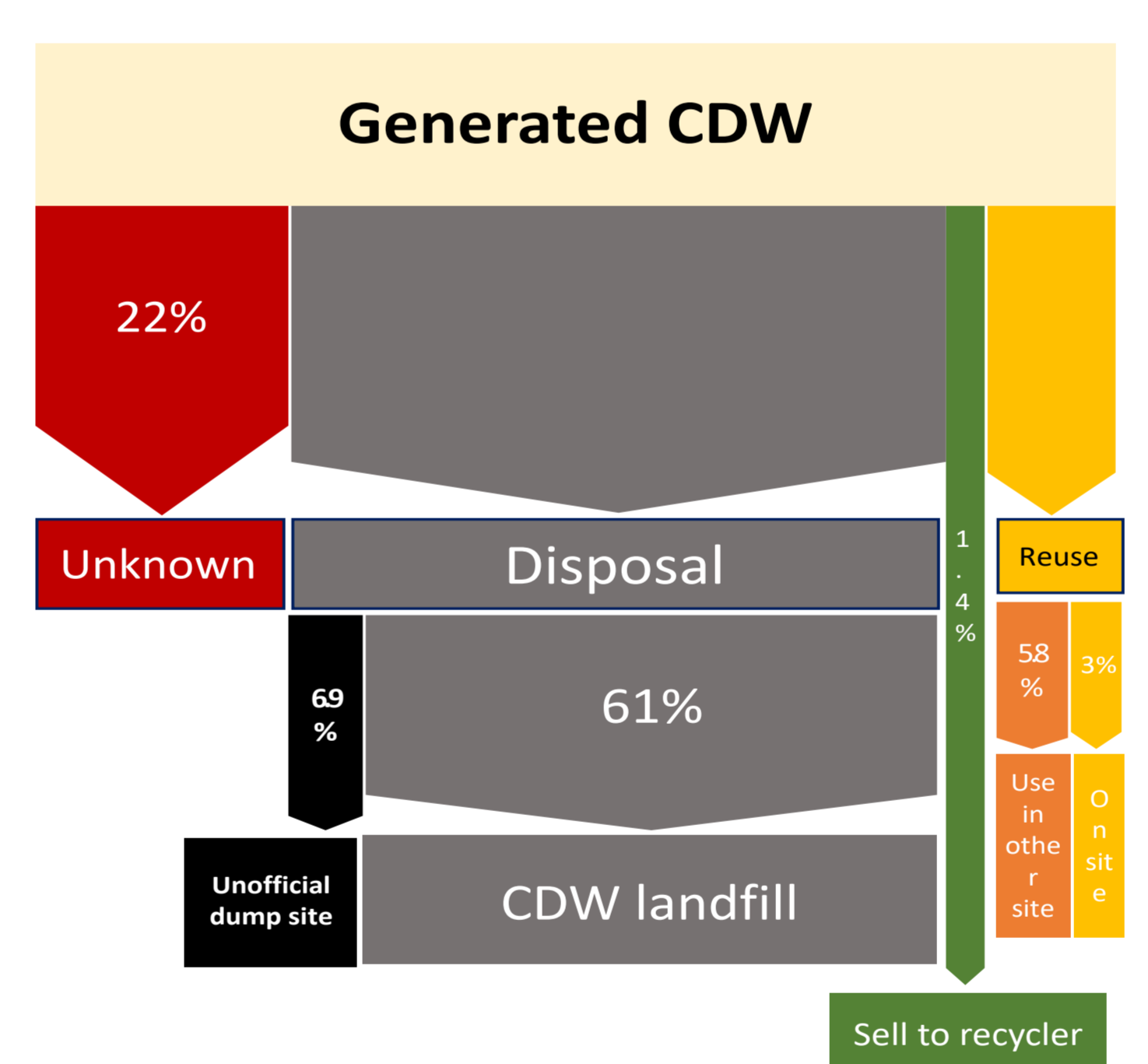


Estimated amount of CDW generated in Vietnam from 2012-2016 (million tons)

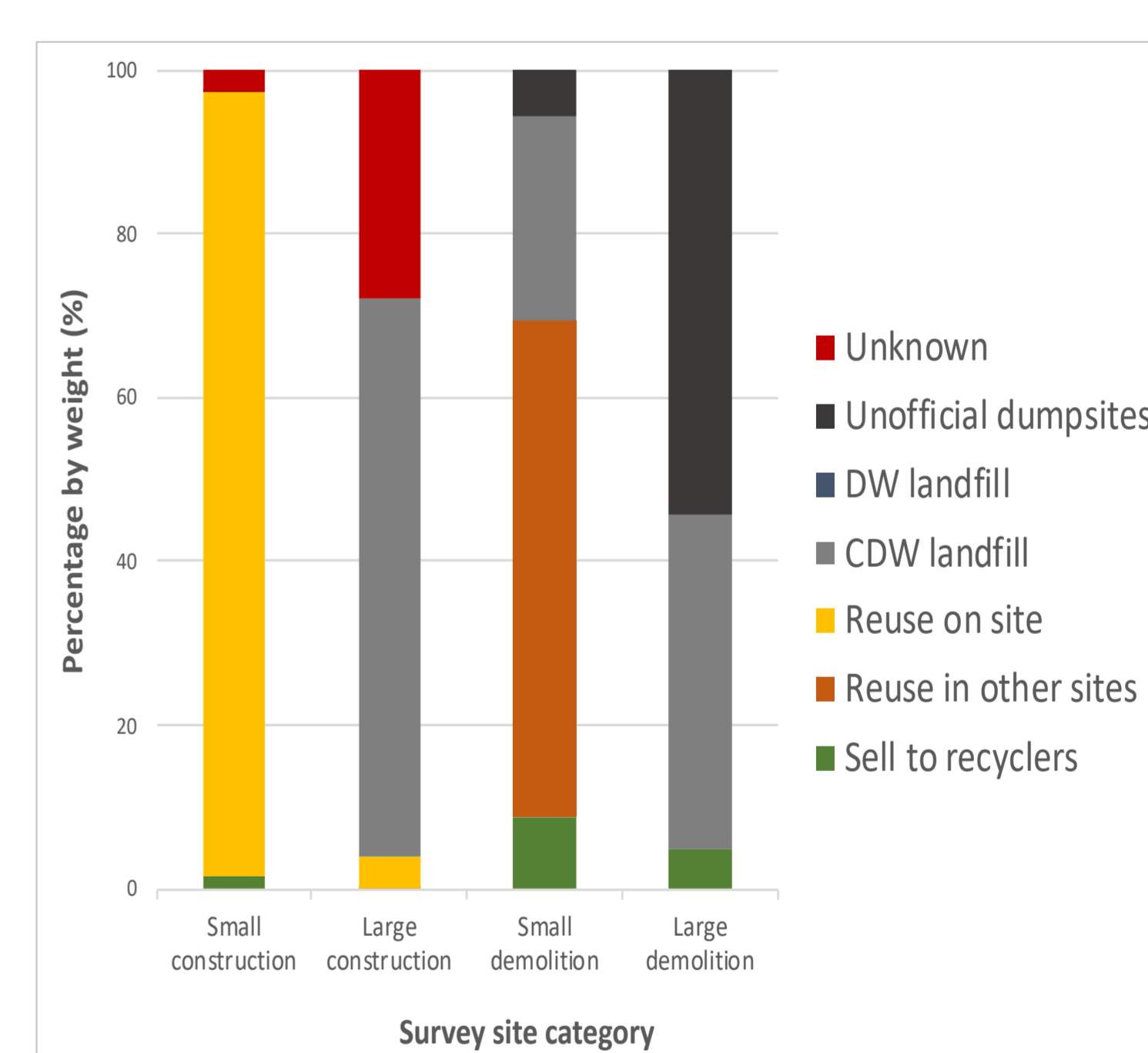


CDW per capita by country in 2014 (tons)

CDW handling practices



Identification of CDW final destinations in survey sites in Hanoi



CDW flow in survey sites in Hanoi

CONCLUSIONS

- High estimated amount of CDW generated and significant CDW per capita ratio in Vietnam imply a **great waste burden** that the construction industry has caused.
- Current practices of CDW handling are **disposal-prone** and **illegal dumping** is prevalent.
- Soil, concrete and brick deserve **top priority** in CDW management plans/policies.
- The results indicate potential of **CDW recycling industry**, which needs to be promoted through appropriate **business models** and **standards** for CDW recycled products.

