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Forest residues consumption by households in large urban center in Brazil: an overview

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Forest residues consumption by households in large urban centers in Brazil: an overview.

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Introduction

Traditional Use of biomass x Modern Use of biomass

Traditional use of biomass

- Inefficient processes of biomass transformation as burning with low technology;
- Use of firewood and residues unsustainable.

Source: Sindicato dos bancários, 2019 (https://spbancarios.com.br/05/2019/mais-de-14-milhoes-de-familias-usam-lenha-ou-carvao-para-cozinhar-diz-ibge)

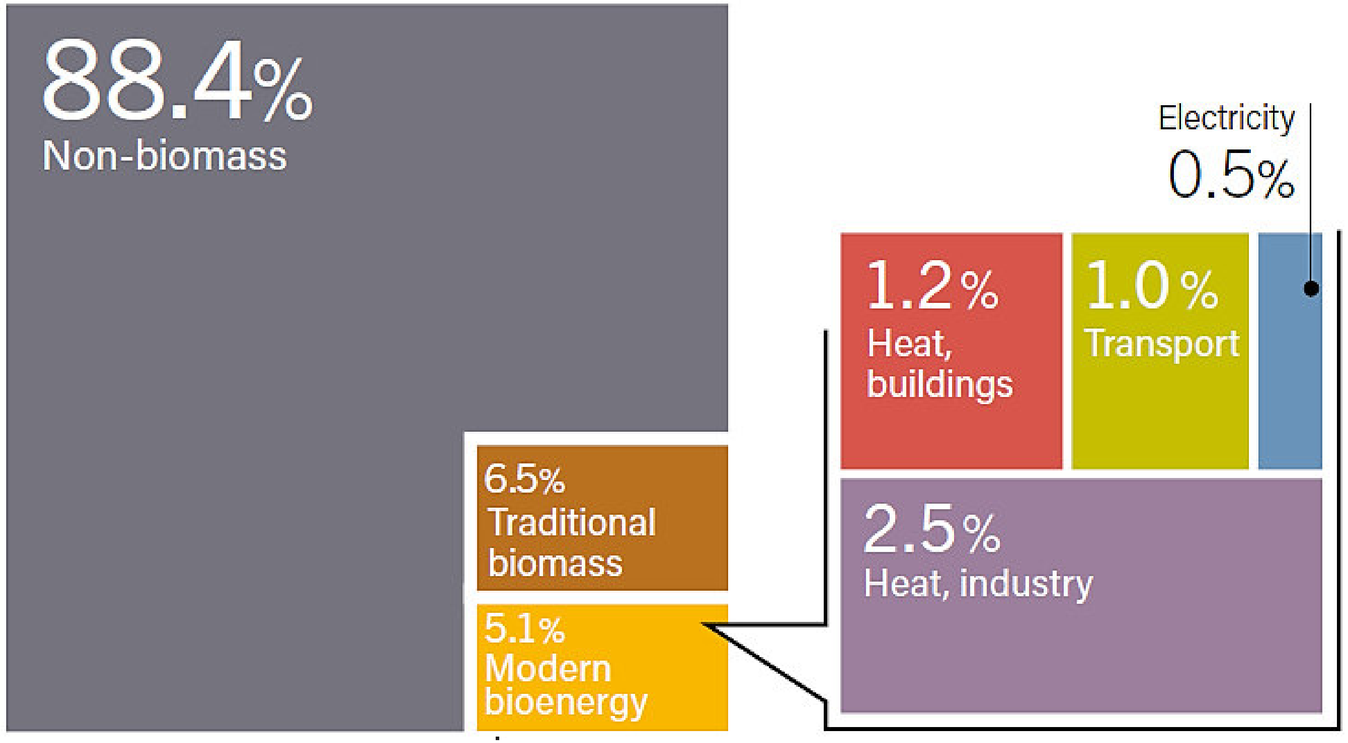
Modern use of biomass

- Involves the use of advanced and efficient technological processes such as liquid biofuels, briquettes and pellets, cogeneration.

Source: Metavila, 2020 (https://metavila.com.br/o-que-e-pellet/)

Introduction

Estimated shares of bioenergy in total final energy consumption in the world in 2019

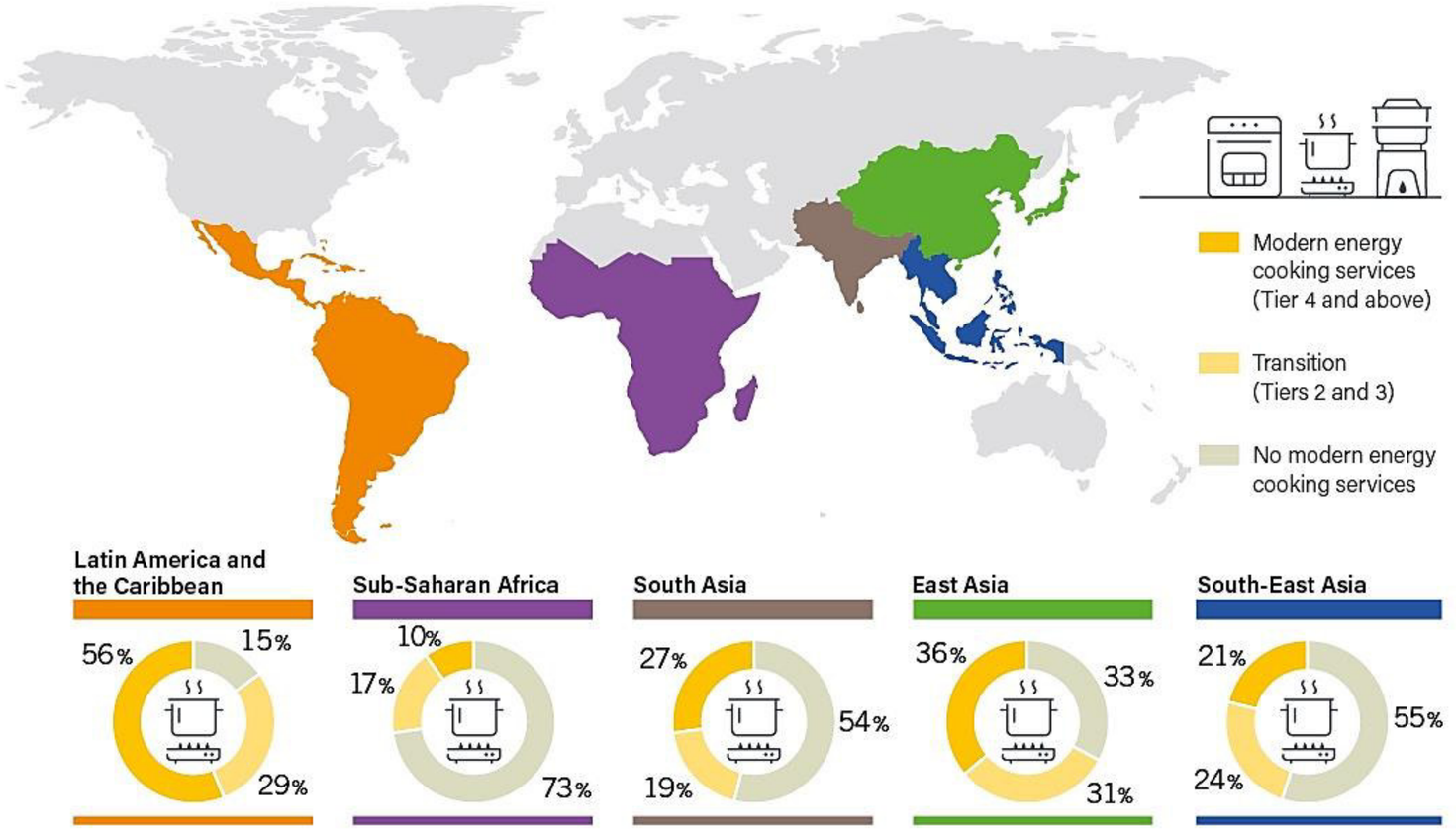


Source: REN 21 (2021).

Global overview

- **World:** 2.6 billion people use firewood and charcoal as their main source of energy.
- **Europe:** better systems, with air injectors, filters, among other devices to reduce the emissions of particulates and other toxic gases that cause health problems.
- **Africa:** burning is direct and in enclosed environments where there are plenty of people.

Population with Access to Modern Energy Cooking Services, by Region, 2020



Source: REN21 (2021)

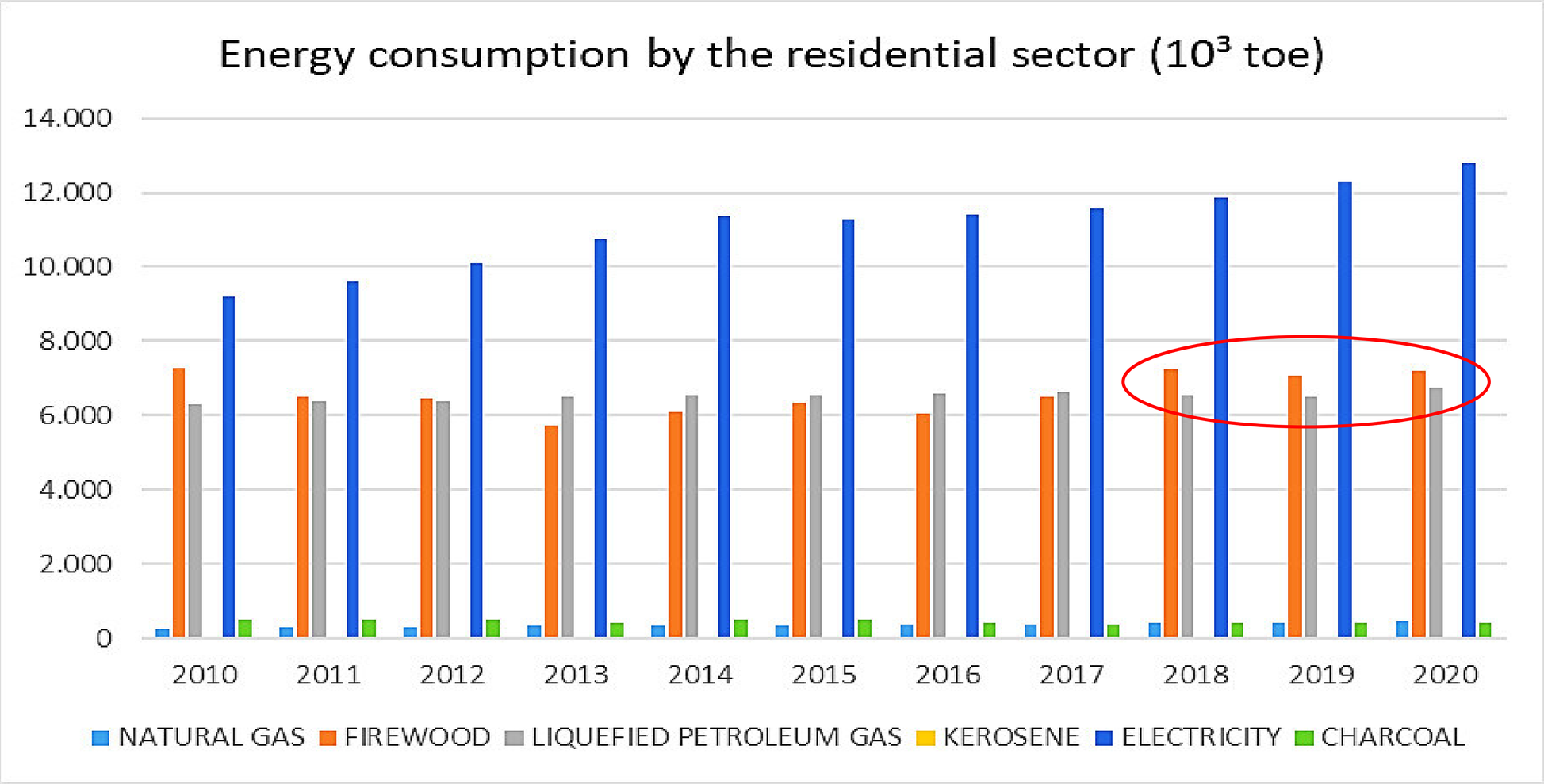
Brazil context

- Approximately 3 million use firewood and charcoal as their main source of energy;
- 2017 - Changing in cooking gas prices influenced the use of firewood;
- Economic scenario and covid pandemic increased the use of firewood as fuel for cooking (setback on energy transition);
- Cooking gas price: March 2019 ➡ R$ 69,17 = U$13,73*

  March 2022➡ R$ 102,51 = U$ 20,35*;
- Two years ago, one in four Brazilian families used firewood at some point to make their food;
- In the Southeast region, where historically the use of firewood is rarer, the increase was even greater, more than 60%, in comparison.

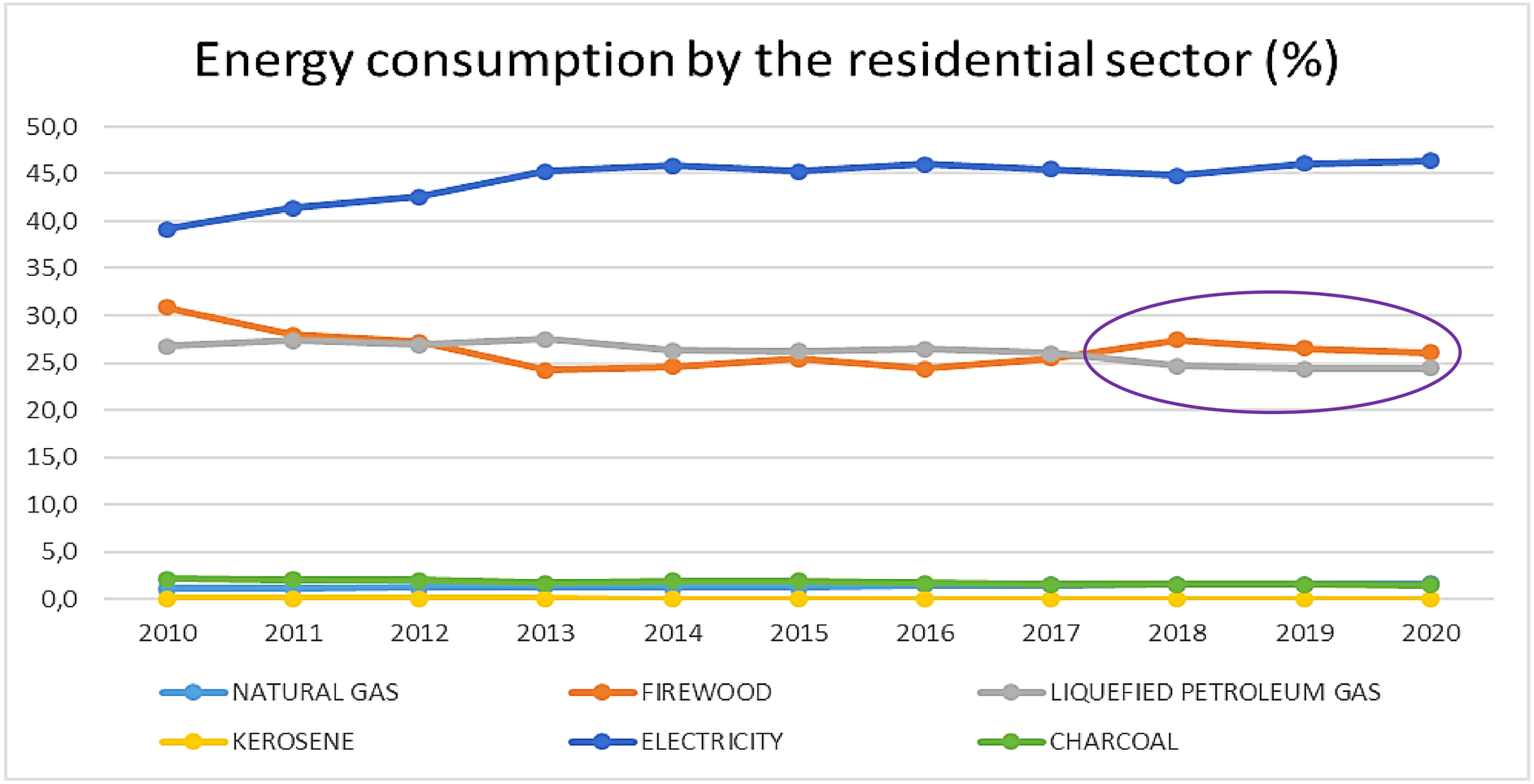
Source: CSWG 2030A (2021); UOL: https://economia.uol.com.br/noticias/estadao-conteudo/2021/10/10/brasileiro-ja-usa-mais-lenha-do-que-gas-na-cozinha.htm; WHO (https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health.)
*dollar quote on May 3, 2022

Brazil - Residential consumption



Source: Energy Research Office (2021).

Brazil - Residential consumption



Source: Energy Research Office (2021).

Objective

The objective of this work is compiling data and technical information about the use of the forest residues consumption by households in large urban centers in Brazil.

Methodology

- Databases available in governamental portal of periodicals;
- Digital libraries of theses and dissertations from national and international universities;
- Bibliographic databases of main national and international institutions of research and higher education.

Results - Types of residues and fuel used

- Kerosene
- Alcohol
- Firewood
- Native forest
- Urban tree pruning
- Construction residue
- Wood Furniture
- Waste

DANGEROUS: Some residues (Construction residue and wood furniture) may contain paint, glue, nails, screws and other chemical elements.

Results - Types of wood stove

Inefficient stoves

Source: A voz de Vitória, 2019 (https://www.avozdavitoria.com/preco-do-gas-e-desemprego-elevam-uso-da-lenha-para-cozinhar-no-brasil/)

Ecological stove

Source: Ecofogão, 2022 (https://ecofogao.com/produto/fogao-a-lenha-ecologico-premium/)

Results - Compounds generated in the combustion of firewood

COMPOUNDS	POLLUTANT	SOURCE
Particulate	Inhalable particles (PM10)	Condensation after combustion of gases; incomplete combustion of inorganic material; vegetation fragments and ash.
	Inhalable particles	Condensation after combustion of gases; incomplete combustion of organic material.
	Fine particles (PM2,5)	Condensação após combustão de gases; combustão incompleta de material orgânico.
Aldehydes	Acrolein	Condensation after combustion of gases; incomplete combustion of organic material.
	Formaldehyde	Incomplete combustion of organic material.
Inorganic acids	Carbon monoxide (CO)	Incomplete combustion of organic material.
	Ozone	By-product of nitrogen oxides and hydrocarbons.
	Nitrogen Dioxide (NO2)	Oxidation at high temperatures of nitrogen in the air.
Hydrocarbons	Benzene	Incomplete combustion of organic material.
Polycyclic aromatic hydrocarbons	benzo[a]pyrene(BaP)	Condensation after combustion of gases; incomplete combustion of organic material.

Source: Adapted from Arbex *et al.* (2004).

Results - Health problems

- Lower respiratory infections;
- Trachea, bronchus, lung cancers;
- Ischemic heart disease;
- Chronic obstructive pulmonary disease;
- Cataract and blindness;
- Pulmonary tuberculosis;
- Adverse effects on pregnancy;
- Burns;
- Domestic Accidentes.

Results - Consequences

Regression with the SDG - Sustainable Development Goal number 7:

- Target 7.3 aimed at doubling the global rate of improvement in **energy efficiency** and;
- Target 7.a aimed at facilitating access to **clean energy research and technologies**, including renewable energy, Energy efficiency and advanced fossil fuel technologies are in retreat in Brazil for lack of constant investments in public policies and R&D.

Source: CSWG 2030A (2021).

Final Considerations

- Most vulnerable population is affected, especially women and children;
- In Brazil, economic scenario and covid pandemic have increased the use of firewood and waste to replace Liquefied Petroleum Gas - LPG;
- Need to improve public policies, such as “Auxílio Gás” (Gas Aid in English);
- Need to develop cheaper ecological stoves and social technology;
- Need to improve public health policies to identify the population that uses firewood as fuel for cooking and carry out a health monitoring program.

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