

SUSTAINABLE HOUSING, HABITAT, AND ENERGY SOLUTIONS FOR URBAN POOR

**INTEGRATING LIVELIHOODS, HEALTH AND
CLIMATE RESILIENCE**

Actionable knowledge generated in the MHT-SELCO interventions
March 2021



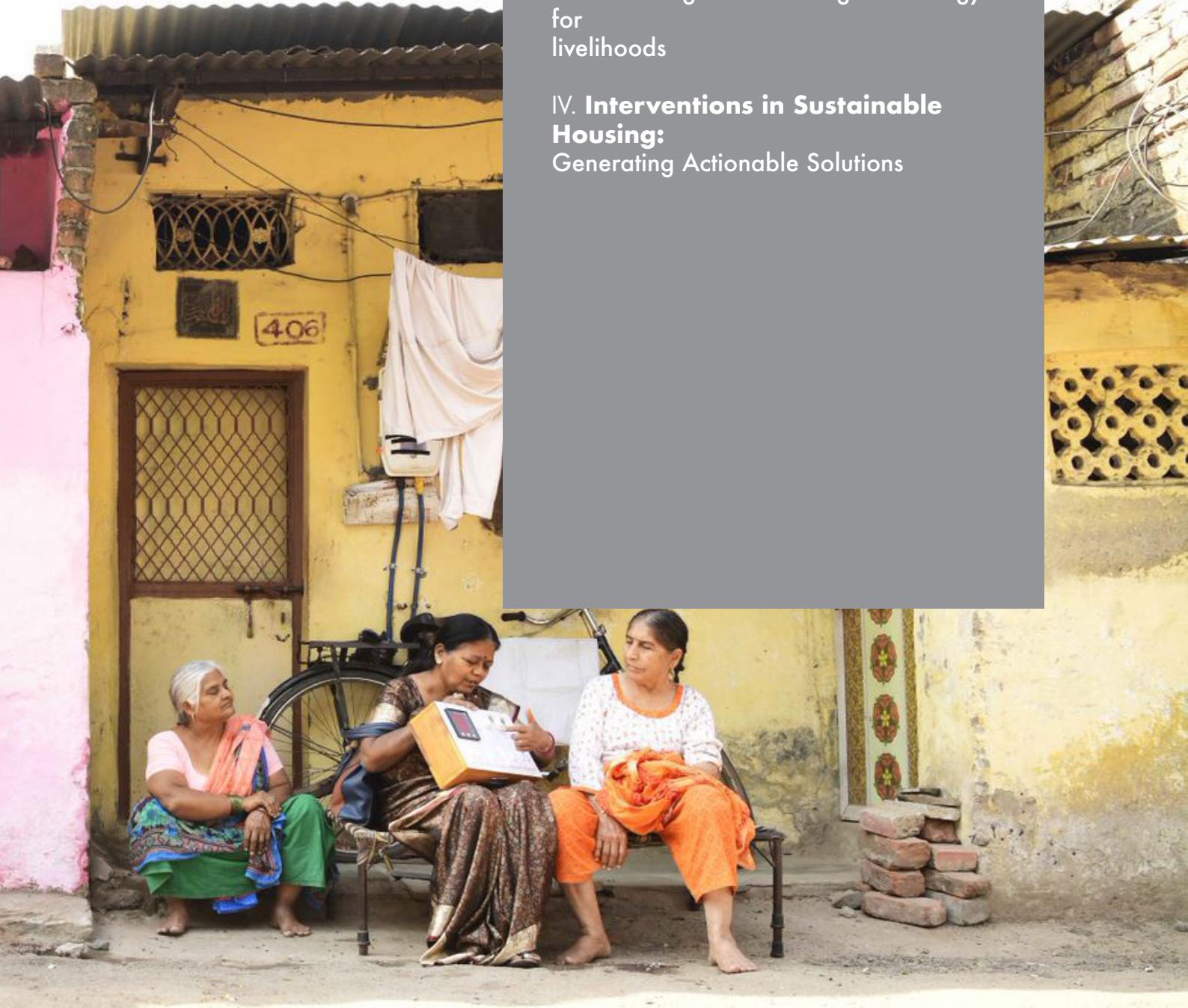


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I. Housing Challenge

A Livelihood Challenge for Urban Poor

A House is a work place for urban poor. It is a place of production and reproduction, a place of sustenance. More than 40% of a city's population lives in slums & informal settlements in South Asia (190.7 m).

In urban slums and informal settlements, households generate income through home-based work and home enterprises. For example, house is a workshop for a panipuri vendor, storehouse for a broom maker, shopfront for a grocer and a place for tailoring, attaching sequins, ironing clothes, making brooms, and the list is endless.

The crux of the housing challenge is that while informality predominates the economic activity in slums, housing continues to be seen and understood as a matter of 'shelter'—a basic need. House as a site of economic activity—essential for livelihood—continues to receive scant attention.

And what needs larger attention is that there is a gendered pattern to house being a place of production. For about 90% of women

working in the informal sector, home is workplace and productive asset. Women as % of total urban home-based workers is 43% (16,950,000) in India (2010-11).

India had **7.3 million women home-based workers** in urban areas, as of 2012. Their numbers are steadily rising, with 20% of urban women workers being home-based workers.

Source: Women in Informal Employment Globalizing and Organizing, a global network focused on women workers in the informal economy.

Housing for poor is usually perceived as a challenge of housing-stock shortage and that of affordability but it indeed is a challenge of 'adequate housing' or housing poverty. "...a majority of existing housing shortage comes from housing poverty rather than the absence of homes entirely".

Seven out of every ten houses are constructed by people themselves in India. When poor build their own houses, they tend to remain inadequate because they are built incrementally as per availability of capital (savings or credit) and a paucity of pro-poor market-based solutions. Public housing solutions invariably are heavily oriented towards creating more stock and making units affordable. Whether private or public, inadequate housing leads to many trade-offs like thermal comfort and energy efficiency.

There is a great need, now than ever, to integrate housing, habitat and energy solutions with economic activity (livelihoods), health and climate resilience. Housing poverty

is invariably accompanied by energy poverty and is a legitimate nexus challenge (Housing-Energy-Climate-Heat-Livelihoods). There is a limited application of the understanding that housing and energy are mutually constitutive and tightly intertwined.

For example, housing typology, building design and layouts, building and roofing materials have a marked impact on heat stress which is a reason behind high energy consumption. Improving access to energy efficient housing (layouts and building materials) and reliable energy services have to be tackled in a unified way. It is important to increase the choice of housing materials and energy solutions, develop a paradigm of offering design and layout services, and provide financial solutions for improving uptake. It is imperative to engage with poor communities to design solutions and mainstream them into market-based solutions. The MHT SELCO Interventions in sustainable housing demonstrated and validated a range of solutions, generated actionable knowledge being shared here.

Housing Gap in Numbers

By 2030, an estimated 45 percent of India will have urbanized, accentuating the problem of slums. Urban housing shortage in India stands at 18.78 million units, out of which about 96% is in the Economically Weaker Section (EWS, 56%) and Low-Income Group (LIG, 40%) categories put together.

ADEQUATE HOUSING

Adequate Housing refers to "adequate privacy, adequate space, adequate security, adequate lighting and ventilation, adequate basic infrastructure and adequate location with regard to work and basic facilities-all at a reasonable cost."

'Global Strategy for Shelter to the Year 2000' declared by the United Nations General Assembly

AFFORDABLE CAN BE SUSTAINABLE!

Affordable housing has come to mean low specification, low quality and low-cost building materials which defeats the purpose of housing for poor because it compromises thermal comfort, durability of materials, low of aesthetics and fails to meet adequate housing requirements. Sustainable housing solutions can lead to an increase demand, which in turn can spur more innovation.

More than 50% of the urban population lives in informal settlements with housing built or expanded incrementally over years.

Out of every ten houses constructed in India, seven are constructed by the people themselves, two by the government, and one by the private sector.





II. Informality and Inadequacy: Locating the problem of Housing Poverty and Energy Poverty

Housing determines economic and social opportunities. "...housing shortage in India is not one of vast shelterless communities but of existing, often self-built 'affordable housing that is inadequate.' Housing challenge remains pernicious and there is a need to locate the problem of housing for urban poor which intersects with a host of vulnerability drivers. The root causes of the housing challenge need to be addressed for bringing in transformative change.

1. House is the workplace:

Housing and energy solutions have to reflect the acceptance of informality as a reality and enable housing for poor to become more productive and support the livelihoods of the poor.

2. Housing and Energy, two sides of the same coin:

Energy demand is mediated through housing—the building materials, the layouts and as an input to production. Access to sustainable building and energy solutions is paramount to energy savings, thermal comfort, improving productivity and reducing drudgery.

3. Structural inequalities: Slums or informal settlements face persistent threat of eviction. It is a singular condition that determines housing status. Illegality is a barrier which enables marginalization. For example, the choice of building material is directly related to poverty, illegality and marginalization. Tin sheet roofing is preferred because it can be reused in case of eviction.

4. Inadequate Housing is a big(ger) problem: Whether newly constructed or an upgrade, the essential constituents of adequate housing solutions have to include comfort (lighting, ventilation,

cooling), basic services and infrastructure (drinking water, toilets, drainage, paved pathways), safety from floods, water logging, and vector infestation, clean and hygienic surroundings.

5. Nexus challenge:

Recognizing Housing-Energy-Climate-Heat-Livelihoods nexus is critical to creating sustainable housing solutions. For example, thermal comfort has an impact on health, well-being, household economics and energy consumption. Nexus based solutions improve productivity, and these gains translate gains into improvements in human development.

6. Incremental housing:

Most poor build their houses in small additions or in phases—given that they have meagre resources. Sustainable housing solutions have to be amenable for upgradation and incremental investments.

7. Gender-smart housing:

Adequate housing and energy solutions have to support the care and productive functions of women. Reducing drudgery has to be an important goal.

8. Pro-poor solutions:

Designing pro-poor solutions requires validation and customization by the poor themselves, especially women, and amongst others, co-development of actionable knowledge is essential.

9. Public and Institutional

Housing: Public housing is an opportune pathway to mainstream sustainable housing solutions. Public housing can set the benchmarks.

10. Access to capital:

The usual trajectory of transitioning from a kutchha/ partly pucca house requires capital investment. Finance is a determining factor for housing/upgrade investments which in turn is an investment for livelihoods (improving productivity).

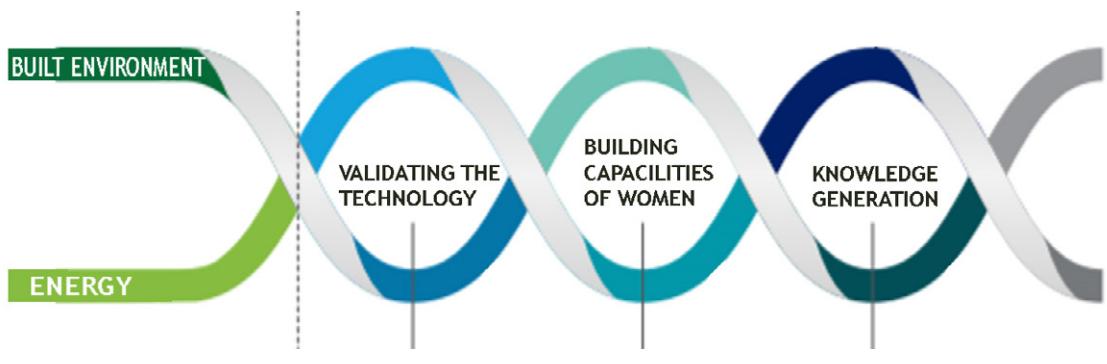
SUSTAINABLE HOUSING IS A SOCIO-TECHNICAL CHALLENGE.

MHT developed a model where poor women take lead in incubating technological products/processes for locally relevant, pro-poor, energy efficient and gender smart housing solutions. More such models are required to promote sustainable housing.

III. Sustainable Housing Solutions:

Efficient integration housing and energy for livelihoods

MHT-SELCO interventions in Sustainable Housing and Habitats have focussed on three key aspects:



- i. Scoping, validating and adapting building materials and energy products to address built environment and energy efficiency challenges to support livelihoods and climate resilience.
- ii. Elaborating the role of women in articulating their housing and energy needs, building their capacities to inform design processes, and improve uptake of sustainable housing solutions.
- iii. Generating actionable knowledge for influencing urban governance, designing financial solutions, shaping market forces and individual behaviours.

WOMEN-LED MODEL-WHY AND HOW DOES IT WORK BETTER?

Women's participation, even though tough initially yields satisfactory outcomes, both for the individuals and community. Women have keen insights of their own needs (household/ livelihood) and circumstances, and usually feedback is quick and robust, generating highly contextual solutions. Woman-woman interactions in slum communities not being constrained by social norms open up access to other households and build a critical mass for receptivity of a sustainability solution.

IV. Interventions in Sustainable Housing: Generating Actionable Solutions

Interventions are a means to scope, demonstrate, validate and adapt solutions that make incrementation, institutional and public housing sustainable and affordable. It also enhances the salience of sustainable housing solutions. The goal is to be able to translate the knowledge generated to design standardized templates and models for incrementation or fresh construction in slum housing. The insights generated in the interventions is presented here.

LIFE CYCLE THINKING

Housing, ipso facto, is an energy- and resource-intensive sector. Housing development is an immense opportunity for introducing life-cycle thinking into the public housing/ incremental housing. The Indian government intends to construct 20 million units through a combination of slum upgrading projects in partnership with the private sector, direct government-led housing delivery, a credit-linked subsidy scheme as well as by supporting beneficiary-led construction.

The interventions are explored and demonstrated in the following four key categories:



1. Pilots in
construction
materials & layouts



2. Pilots
in Energy
Efficient



3. Pilots in
Institutional
Housing



4. Pilots in
Public
Housing

1.



PILOTS IN CONSTRUCTION MATERIALS AND EFFICIENT LAYOUTS

Built environment refers to the structural and physical elements of a dwelling. It is building materials, those used for roofing and walling, and layouts (location and size of doors, window and ventilation and space design) are critical to improve the overall quality of the built environment. The prevalent materials score quite low on heat stress protection in the already obsolescent and congested houses in slums. Constraints posed by orientation and shape of plots leave little flexibility for passive design aspects. The interventions are a means to identify and validate alternative solutions that build resilience to heat stress, reduce indoor temperatures and lower energy needs and improve health status of the residents. Interventions were carried in roofing and walling solutions and layout design services to improve the functionality of space.

INTERVENTIONS - SNAPSHOTTS

A. Roofing Solutions

I. ModRoof -

Sarkuva Ashramshaala,
Vyara, Surat



Lilapur Community school,
Lilapur, Ahmedabad



II. Eco Shelter BambooRoof -

Lakshmiben Goel's Grocery
store, Ahmedabad and Surat



Lakshmiben Chavda's
house, Ahmedabad



II. EcoBoard Panels

Bagsiwaniya Anganwadi,
Bhopal



B. Walling Solutions

IV. Covestro's Honeycomb Panels

Dining Hall, Gadat
Ashramshaala, Vyara, Surat



V. STRAWCTURE ECO [Compressed Agricultural Fiber

Rajabeti's House – Pani Puri
making, Ahmedabad



INSIGHTS

1. Thermal comfort is emerging as a strong consideration for the poor for choosing roofing material. Roofing solutions that meet two critical objectives—**thermal comfort and energy savings— have a marked influence in health, wellbeing and productivity** (savings and increased output).
2. People are ready to invest in products like ModRoof that meet durability, strength, aesthetics, aspirations (false ceiling, recessed lighting) and support incrementation (another floor), despite being costlier if suitable financial solutions are available thus breaking a myth that poor prefer cheaper solutions. **The actual problem is lack of access to financial solutions.**
3. Those who invested in roofing solutions were interested in one or more of these: **better health and productivity outcomes (thermal comfort), incremental expansion** (roof for top floors) and for aspirational value.
4. **Not all alternative solutions are readily accessible** as products. Solutions that are easily available will be readily taken up.
5. **Solutions have to be customized for local climatic conditions** otherwise performance of products will deteriorate overtime which means they will go back to prevalent products.
6. Some materials **require back-end integration of skilled masons** and contractors for installation. Such requirements may ramp up landing cost of product.
7. **Touch and feel demonstrations are helpful in generating demand.** Institutional and public housing can actually help in building trust around these solutions.
8. Counterintuitive technologies which are not perceptibly strong or sturdy but in fact are **require more efforts to be accepted as a long-lasting solution.**
9. Subdued acceptance of products due to pricing may lead to the products not achieving scale which is **essential for price decrease in the long run.**



2.



PILOTS IN ENERGY EFFICIENT APPLIANCES AND TECHNOLOGIES FOR LIVELIHOODS

The energy paradigm of urban poor is characterized by illegal and irregular access to electricity, high inefficiencies due to inadequate housing, lack of access to energy efficient appliances and sustainable energy solutions for housing and livelihoods, and an absence of financial mechanisms for uptake of solutions.

What needs particular attention here is that housing (building material and layout) mediates energy consumption, whether it is for lighting, cooling or livelihood activity. Accepting informality and micro entrepreneurship as an economic reality of the urban poor means seeing energy and housing as conjoined issues. The interventions solarizing appliances and equipment used for livelihoods that otherwise run on grid electricity or human power, to economise the input costs by reducing the electricity consumption.

INTERVENTIONS - SNAPSHOTs

Energy efficient technologies and appliances

**Energy Efficient Refrigerator,
Ahmedabad**



**Energy Efficient Sewing
Machine, Ahmedabad**



**Soldering Iron,
Surat**



**Energy efficient Milking
Machine, Ahmedabad**



**On Grid Solar Roof top
System (Printing Machine),
Ahmedabad**



**Fuel efficient cook stove,
Gadat Ashramshaala,
Vyara**



**Off-grid Solar Roof Top System,
Ahmedabad**



**On-grid Solar Roof Top System,
Gadat Ashramshaala, Vyara**



INSIGHTS

- There is a **high demand for energy efficiency solutions** across various livelihoods and micro enterprises such as home-based grocery shops, food processing and packaging, tailoring, crafts making etc.
- Solarizing equipment used for livelihood activities (through off grid solar system) **reduced energy bills.**
- Participating households started using solar energy to run fans and bulbs—indicating a **huge demand for economising energy consumption.**
- Households switched from manual to electricity run appliances (example, sewing machines, roti making) after solar roof top systems were installed as it greatly **reduced energy expenditure, contributed to productivity and in minimizing drudgery.**
- It worked not only to solarize equipment used for just livelihood activities but **other appliances in the household by installing a solar roof top system.**
- Households are **willing to invest in solar roof top system if financial assistance is available.** There has been an increased demand for solar roof top system through AWAAS SEWA Pvt Ltd which markets sustainable housing and energy solutions.

3.



PILOTS IN INSTITUTIONAL HOUSING

Salience of sustainable built environment and energy efficiency solutions in a community has a bearing on uptake of sustainable solutions by the community.

This is best achieved by transforming institutional housing like anganwadis (child care centres) and schools. When newer technologies are experienced by the community, they are more pre-disposed to adopt the solutions.

INTERVENTIONS - SNAPSHOTs

**Sarkuva Ashramshaala,
Vyara, Surat**



**Bagsiwaniya Anganwadi,
Bhopal**



**Lilapur Community school,
Lilapur, Ahmedabad**



**Dining Hall, Gadat
Ashramshaala, Vyara, Surat**



INSIGHTS

- There is a **surge in demand from other schools for solar energy systems by word of mouth.** This has immensely helped in spreading awareness about sustainable energy solutions.
- The institutions are making considerable **savings in their energy expenditures.**
- Savings in electric bills has promoted the uptake of equipment like automatic roti makers and vegetable cutter which contributed to improved productivity. This also **reduced drudgery.**



PILOTS IN PUBLIC HOUSING

INTERVENTIONS - SNAPSHOT

Research on "The applicability of Energy Conservation Building Codes in Public Housing", Ahmedabad



Two of every ten houses are constructed by the government. The public housing sector needs to demonstrate a range of sustainable habitat solutions, including renewable energy solutions like solar lighting systems for street and corridor lighting, rainwater harvesting and grey water reuse which usually require large space for construction.



Solarised Water Pump, Fakira Housing Society, Ahmedabad

INSIGHTS

- Sustainable housing solutions in public housing serve to **spread awareness about solar energy solutions** to various stakeholders like local governments, community members, builders, developers and so on.
- Uptake for **solar energy products increases** if public housing is equipped with solar solutions.
- The energy expenses of public housing have shown **savings up to 40%**.

V. FINANCING SUSTAINABLE HOUSING INVESTMENTS

Credit cooperatives in Ahmedabad, Surat and Vadodara in the state of Gujarat enabled women in informal sector to access unsecured loans for housing upgrades. As a scaling up initiative, credit cooperatives of MHT deliver micro finance loans to households for making housing investments. The Interventions initiated under various thematic categories intend to be Rated on identified parameters to understand the success in scaling of sustainable housing technologies.



Mahila housing SEWA trust (MHT) Founded in 1994, with the mission of promoting sound habitats and living environment of poor women in the informal sector, MHT, believes that if the capacities of the marginalized especially women, are enhanced to exercise their civic rights, poor women can become drivers of sustainable and inclusive urban development in their communities and cities. Key work areas of MHT include WASH, Skill Development and Livelihoods, Sustainable Energy and Climate Change Resilience, Affordable Housing and Land Rights and Democratic Urban Governance and Planning.

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SELCO Foundation was founded in 2010 as an open source, not for profit, public charitable trust with a vision to bring impact through sustainable energy innovations and enterprises and Redefining scale through replication by contextualizing innovative, sustainable – social, technical and financial models that address climate change. It is headquartered in Bangalore, Karnataka.

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