

# Briefing

## Sustainable markets

### Keywords:

Waste, green economy, informal sector, information and communication technologies (ICT), India



Issue date  
December 2014

## Policy pointers

**E-waste regulation** should build on existing practice and enable informal actors: collection and processing models that include small-scale and informal enterprise can be more efficient than purely formal models.

**The economics of hybrid** formal-informal models need to work all the way along the chain, so new formal recyclers can compete with mature informal markets. Getting pricing incentives right is important for a successful model — from collection through to final recycling or refurbishment.

**Better cooperation** between manufacturers, regulators, policymakers and informal recyclers is important: current regulations are more principle than practice — offering little incentive to enforce regulations or encourage manufacturers to work with others.

**Better information and education** channels that influence public behaviour are key: Indian households see waste as a 'marginal commodity' to be sold to the highest bidder; consumers must understand the environmental and human impacts of unregulated e-waste recycling.

## Innovations for inclusivity in India's informal e-waste markets

The success of policies in driving the transition towards green economies often relies on their ability to include the informal sector. The vast majority of India's huge waste collection and recycling markets are informal, and e-waste is no exception. Regulations that came into force in 2012 are pushing for much-needed greener and safer practices, but threaten the livelihoods and security of this large informal workforce. This briefing draws on experience in India and elsewhere to look at the current mismatch between regulation and reality, and to identify the types of mechanisms that could steer India's e-waste market towards greener and fairer outcomes.

E-waste is a hazardous but valuable resource. Managed well, large quantities of raw materials and reusable parts can be recovered, with associated emission savings. But when processed crudely, in ways that harm human health and the environment and intensify the vulnerability of workers, much of its potential for value recovery is lost.

Informal markets — where most of the world's poor work, consume and trade — dominate India's e-waste collection, dismantling and recycling activities. These are often unmonitored, taking place on the periphery of large urban conurbations. They risk introducing harmful chemicals into the air, water and soil, posing challenges for municipalities and local communities.

Many e-waste workers have developed their practices over many years operating in a relative regulatory vacuum. They are highly skilled at manual dismantling, with far-reaching networks enabling e-waste collection from small, peripheral sources, and detailed knowledge of electronic appliances and the value of components. For the formal sector or local authorities to duplicate such activities would demand huge expense and unfeasibly efficient management systems.<sup>1</sup>

India's e-waste recycling sector should capitalise on the strengths of this huge workforce and see it

as part of the solution, rather than an obstacle, to more inclusive green economies. But the nuances and inequalities that exist in the informal e-waste economy must be understood, including the difference in income levels between poverty-driven, survivalist labourers and more autonomous owners of rapidly growing small enterprises.<sup>2</sup>

### A global issue

With more than 40 million tonnes of electronic and electrical equipment (EEE) discarded around the world every year, e-waste is a global concern.<sup>3</sup> Despite an international legal framework controlling trans-boundary movements of hazardous waste, the expense of proper disposal in developed countries is a major driver for shipping e-waste to poorer countries with abundant, cheap labour, including China, India and Ghana.<sup>4</sup> In fact, 70 per cent of India's e-waste is believed to originate abroad.<sup>4</sup>

Worldwide consumption patterns are also changing: low- and middle-income countries now generate more e-waste than developed ones. This presents a potentially significant new revenue stream, and new governance challenges that demand policy attention beyond integrating with international import-export regulations.

## The nuances and inequalities of the informal e-waste economy must be better understood

### New governance challenges

Until recently, India had no specific law governing e-waste disposal, despite decades of processing domestic and imported e-waste and an IT industry that has grown rapidly since the 1990s. The Ministry of Environment and Forests first produced

guidelines for managing e-waste in 2008.

Organisations including GIZ, Greenpeace and Toxics Link influenced the final legislation that came into force in 2012. These rules emphasise two ways to promote safer, more

efficient e-waste management and handling — reducing hazardous substances and extended producer responsibility.

Under the latter, manufacturers of EEE are responsible for recycling their products at end of life, using appropriate technologies to safeguard environmental and human health, and creating and financing collection systems for post-consumer waste.<sup>1</sup> Evidence to date shows little movement on implementation from state regulators or companies — perhaps due to a current lack of targets<sup>5</sup> — but the rules could still have far-reaching impacts on the informal market. Already highly competitive, the sector may see sources drying up as the new rules prohibit e-waste flows to informal operators.

This has serious implications for the livelihoods of India's urban and peri-urban poor engaged in the e-waste sector. Many are vulnerable — often rural migrants with low literacy levels, lacking minimum wages, access to social protection schemes or recognition by the authorities, with women and children frequently doing the lowest-paid, dirtiest jobs.<sup>1,6</sup> For many, this is their main source of income.

The informal waste sector tends to achieve higher collection rates, because their livelihoods depend on it. In Cairo, private sector involvement in solid waste collection led to a drop in recovery rates. As a result, some municipalities have recently abandoned multinational contracts in

favour of reintegrating and reorganising the city's vast informal workforce.<sup>7,8</sup> Big institutions in China and India can successfully operate high-technology recycling plants, but often cannot access sufficient e-waste to be economically feasible.<sup>9</sup> Informal collectors can help bridge this gap, and should be valued rather than excluded. For dismantling, low-cost manual workers may be critical for the economic feasibility of the whole e-waste value recovery model in emerging economies.<sup>10,11</sup>

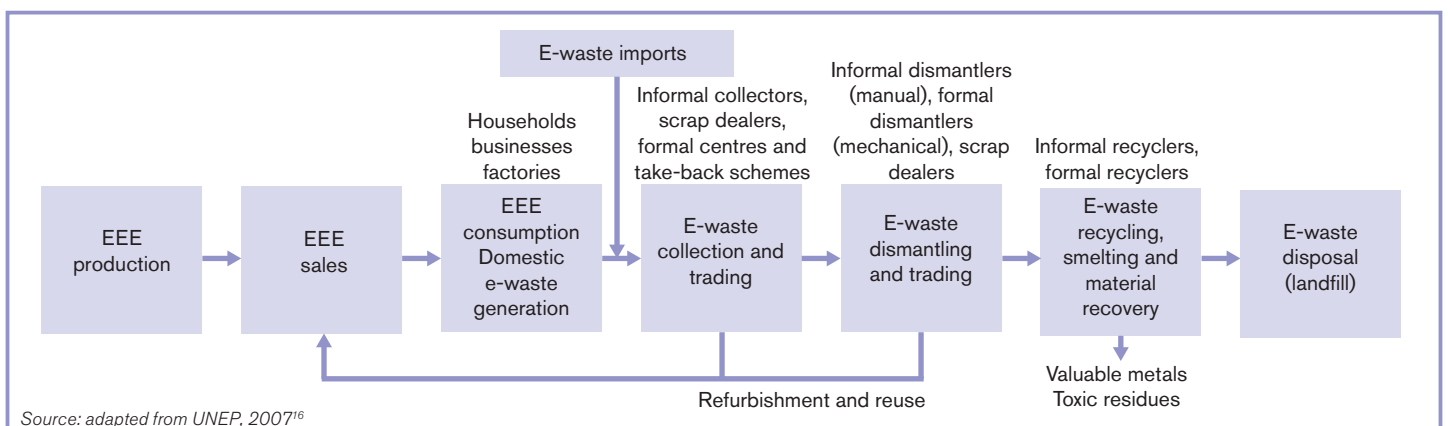
### Emerging hybrid models

Informal e-waste actors bring many benefits that are broadly representative of solid waste management in middle- and low-income countries. But the hazardous nature of e-waste makes it a special case when exploring inclusive mechanisms for 'greening' supply chains. The vulnerability of many informal e-waste workers is exacerbated by the lack of benefits offered by formalisation, particularly basic protection from occupational health hazards.<sup>12</sup> Therefore, within current technological constraints, markets for the end-processes of e-waste recycling — such as chemical stripping and incineration — should undergo some degree of formalisation to ensure safety.

A green and inclusive e-waste economy must promote livelihoods and protect the environment, while protecting workers, their families and community health from toxic substances released during recycling processes. One solution may be hybrid models where existing informal collection and dismantling markets are supported by, and integrated with, formal recycling companies using clean technologies for metal recovery and toxic compound disposal.

Models of formal-informal sector integration that aim for economic efficiency will not necessarily lead to social welfare synergies,<sup>2</sup> so hybrid models must recognise and avoid potential risks, such as intensifying vulnerabilities, power imbalances around model design, diverging interests leading to exploitation, and undermining of informal worker organisations.<sup>2</sup>

**Figure 1. Simplified life cycle of electronic and electrical equipment (EEE)**



Box 1 contains examples that tentatively explore the potential of hybrid models. They show the potential for business support mechanisms, such as start-up grants, simplified company registration and land allocation, to engage organised groups of informal actors to supply materials to 'clean channels'. They also illustrate two of the biggest challenges for designing mechanisms that 'green' e-waste chains while promoting inclusivity — pricing incentives and the loss of livelihoods for those involved in hazardous recycling practices. Both formal and informal agents clearly recognise the benefits of hybrid models, but current policy frameworks have limitations, particularly in gaps in appropriate guidance and support.

### Critical challenges to governing the e-waste sector inclusively

**Making the economics work.** India's changing regulatory context is encouraging many new formal recycling companies. But emerging evidence from China and India shows that the ultimate success of policy implementation depends on reconciling the informal and formal economies — particularly their pricing structures — so that new models can collect enough e-waste to function cost-effectively.

For example, a successful pricing intervention pilot in Chinese cities using old-for-new subsidies found that materials stopped being channelled to formal recycling when the subsidy ended. A UNEP initiative in Suzhou, China, capable of recycling 100,000 computers annually, was not operating to full capacity six years after it launched, as informal actors continued to collect most of the 400,000 computers discarded in the area every year.<sup>10</sup> Similarly, a Delhi-based NGO-Nokia partnership to engage informal collectors in channelling unusable mobiles to an authorised recycler struggled with supply and quickly fell apart.<sup>6</sup>

In each of the above, failure was largely due to the difference between the price that formal and informal collectors and recyclers are willing to pay for materials. Research in Delhi has found that informal recyclers with cheaper operating costs will pay double formal recyclers' prices for hard disks and mobile phones, and three times the amount for computer processors.<sup>6</sup> To recommend policy interventions that incentivise informal actors to divert materials into clean (formal) recycling channels, pricing incentive nuances must be better understood.<sup>14</sup>

**Refurbishment.** Still-useful components fetch a far higher price for reuse than for metal extraction, and refurbishment presents an entrepreneurial opportunity for those with repairing skills. Where wealth inequalities exist, for example between urban and rural areas, growing demand for cheap

### Box 1: Examples of models aimed at integrating India's informal e-waste workforce

**The Indo-German Swiss e-waste initiative (Bangalore).** Launched in 2004, this project aimed to establish a separate e-waste channel for the city, from collection through to processing and disposal. It set up an e-waste disposal code of conduct for Bangalore's IT companies designed to exclude informal practices and created a process to register, train and relocate informal workers to industrial zones. But recent research has found that materials now largely circumvent the few 'formalised' collectors, whose networks of relationships with businesses have been severed. Although only partially successful, pilots to replicate the initiative have begun in Delhi, Kolkata and Pune, hopefully having learnt from the problems faced in Bangalore.<sup>16</sup>

**Toxics Link (Kolkata).** This Indian research NGO has developed a range of still largely theoretical models that promote formal-informal linkages, based on good practice elsewhere. It advocates for and is starting to pilot training and capacity building to protect livelihoods, aiming to include existing operational networks of informal collectors in the 'clean channels' promised by the new legislative framework.

**HRA E-waste Pvt Ltd (Delhi).** This company collects, segregates and stores e-waste from some 250 informal collectors and dismantlers, who source directly from households and businesses. It auctions the e-waste to formal recyclers, giving profits back to the informal collectors, less a percentage for overhead costs. Establishing formal operations took a challenging two years, despite technical support from GIZ. The absence of a legal allowance for channelling materials to refurbishment is a continuing problem for HRA's informal collector-suppliers. Even when integrated with formal structures, they continue to channel reusable components to informal markets where profits are significantly greater.<sup>13</sup>

technology can also be a significant driver of informal e-waste activities. In the broader context of manufacture and disposal, diverting e-waste to refurbishment also brings emissions savings.<sup>11</sup>

A thriving refurbishment economy competes with markets for new products, in particular those aimed at low-income consumers, and companies who sell those products have been accused of influencing the design of India's e-waste regulations for their own gain.<sup>15</sup> Channelling components for reuse is illegal under the new rules, discouraging informal actors from engaging with formal systems.

For clean hybrid formal-informal models to work, channels for still useful parts must be guaranteed.<sup>16,1</sup> Policymakers should recognise the importance of reuse, both for the informal economy and low-income consumers, while ensuring refurbished appliances are safe. Developing light-touch (but mandatory) standards might help.

**Change will be slow.** People often do not trust formal systems, so approaches must evolve gradually, starting with efforts to strengthen informal labour organisation.<sup>13</sup> Mechanisms should recognise and work with existing realities — for example, by training informal recyclers about health hazards and providing access to

basic protective equipment. Policy design should also factor in consumer attitudes and cultural norms. If people are used to rewards and door-to-door collection, models that require very different behaviour will struggle.

**Regulations for processing e-waste must be inclusive.** Given the heterogeneous nature of the informal e-waste sector, prescriptive models are unlikely to receive widespread support. Policymakers must create spaces for a variety of models and support innovation. More effort should be made to test a range of hybrid models where collectors and dismantlers are loosely affiliated to syndicates or cooperatives, and existing informal networks are harnessed by incentivising and facilitating people to work with clean recycling initiatives.

Women are more likely to work in lower-paid, more hazardous activities and are often paid less than men for the same work, so more research is needed into gender-disaggregated impacts of models and ways of organising.

**Mechanisms must protect livelihoods, health and the environment together.** Any degree of formalisation may result in lost livelihoods, especially for informal recyclers. While research is needed into safe, low-cost technologies for small-scale recycling, approaches to governing e-waste markets must also aim to formalise the end processes of the supply chain to protect human and environmental health.

**Municipalities can play a key role.** City and local governments have an important stake in the success of waste management policy and are important players in tackling spatial exclusion and inadequate access to appropriate facilities, services and land. Working with forward-thinking local authorities to experiment with new models and ways of allocating space for accumulation and dismantling of e-waste may improve our understanding of the barriers to formalising.

**The public needs better information.** Indian households see waste as a marginal commodity to be sold to the highest bidder.<sup>7</sup> In many ways this is a laudable attitude, but consumers need to better understand the environmental and human

impacts of unregulated e-waste recycling. They also need adequate public information on new take-back systems, collection centres or recycling facilities.<sup>5</sup>

**Engage the private sector.** For extended producer responsibility to take off, a few lead corporations need to invest, think creatively and try new schemes to involve informal collectors.

**Cooperation is key.** To incentivise clean recycling channels, research is needed into bridging the gap between what the informal and formal sectors will pay; where the financing might come from; and, if manufacturers were willing to subsidise collection for clean channels, whether consumer retail costs would be affected. Creating safe spaces for dialogue and experimentation between a range of stakeholders could help, as long as differences in their power and interests are recognised and addressed.<sup>2</sup>

### The chance for positive practice

Informal markets are where most of the world's poor produce, consume and trade, and e-waste is no exception. The space opened up by new regulations offers an opportunity to encourage greater equity and synergistic links with the informal sector by developing mechanisms that work with existing realities.

Much still needs to be explored in India's existing e-waste models to understand impacts of interventions. For example, pricing and supply chains need to be mapped, and financial and information flows better understood. But many emerging economies face similar challenges in e-waste management and, if successful, India could provide an example to follow. So now is the time for public and private sector players to step-up and demonstrate how informal markets can be integral to greening economies.

### Kate Lines and Ben Garside

Kate Lines is a senior coordinator for IIED's Strategy and Learning Group ([www.iied.org/users/kate-lines](http://www.iied.org/users/kate-lines)). Ben Garside is a researcher in IIED's Sustainable Markets Group ([www.iied.org/users/ben-garside](http://www.iied.org/users/ben-garside)).

The authors would like to acknowledge Development Alternatives (Kriti Nagrath, Vaishali Porey and K Vijaya Lakshmi) and Irina Fedorenko, DPhil Candidate, Oxford University, for their comments and input into the content of the briefing.



## Knowledge Products

The International Institute for Environment and Development (IIED) promotes sustainable development, linking local priorities to global challenges. We support some of the world's most vulnerable people to strengthen their voice in decision making.

Shaping Sustainable Markets is an IIED research initiative exploring the design and impact of market governance mechanisms.

Toxics Link is an Indian environmental research and advocacy organisation engaged in disseminating information to help strengthen the campaign against toxics pollution, provide clearer alternatives and bring together people affected by these problems.

### Contact

Ben Garside  
[ben.garside@iied.org](mailto:ben.garside@iied.org)

80–86 Gray's Inn Road  
London, WC1X 8NH  
United Kingdom

Tel: +44 (0)20 3463 7399  
Fax: +44 (0)20 3514 9055  
[www.iied.org](http://www.iied.org)

IIED welcomes feedback via: @IIED and [www.facebook.com/theiied](http://www.facebook.com/theiied)

This research was funded by UK aid from the UK Government, however the views expressed do not necessarily reflect the views of the UK Government.



### Notes

<sup>1</sup> Sinha, S and Mahesh, P (2013) Environment and livelihood hand in hand. Toxics Link, Delhi. / <sup>2</sup> Meagher, K (2013) Unlocking the informal economy: a literature review on linkages between formal and informal economies in developing countries. WIEGO / <sup>3</sup> [www.step-initiative.org](http://www.step-initiative.org). / <sup>4</sup> Sthiannopkao, S and Wong, MH (2013) Handling e-waste in developed and developing countries: Initiatives, practices, and consequences. *Science of the Total Environment* 463–464, 1147–1153 / <sup>5</sup> Mahesh, PB et al. (2014) Time to Reboot. Toxics Link, Delhi. / <sup>6</sup> Chaturvedi, B and Supriya, B (2013) Learning to re-e-cycle. Chintan Environmental Research and Action Group, Delhi. / <sup>7</sup> Gerdes, P and Gunsilius, E (2010) The waste experts: enabling conditions for informal sector integration in solid waste management. GIZ, Eschborn. / <sup>8</sup> Amer, P (2014) Talking "rubbish" with Egypt's environment minister. *Nature Middle East*. <http://blogs.nature.com/houseofwisdom/2014/04/talking-rubbish-with-the-environment-minister.html> / <sup>9</sup> Wei, L and Liu, Y (2012) Present status of e-waste disposal and recycling in China. *Procedia Environmental Sciences* 16, 506–514. / <sup>10</sup> Eisinger, F et al. (2011) Carbon footprint of e-waste recycling scenarios in India. *Adelphi*. / <sup>11</sup> Wang, F et al. (2013) E-waste in China: A country report. STEP / <sup>12</sup> Chaturvedi, A et al (2010) Mainstreaming the informal sector in e-waste management. Briefing prepared for the Urban, Industrial and Hospital Waste Management Conference, Ahmedabad. / <sup>13</sup> Lines, K et al. (forthcoming) Clean and inclusive? Recycling e-waste in China and India (provisional title). IIED, London / <sup>14</sup> Chi, X et al. (2011) Informal electronic waste recycling: a sector review with special focus on China. *Waste Management* 31, 731–742. / <sup>15</sup> Toxics Link, private communication. / <sup>16</sup> Reddy, RN (2013) Revitalising economies of disassembly. *Economic & Political Weekly* 48 (13) 63. / <sup>16</sup> United Nations Environment Programme (2007) E-waste volume II: e-waste management manual. Division of Technology, Industry and Economics, International Environmental Technology Centre.