

# Fair and sustainable food systems: from vicious cycles to virtuous circles

Modern industrial food, energy and water systems are fundamentally unsustainable. Their linear, and increasingly globalised, structure assumes that the Earth has an endless supply of natural resources at one end, and a limitless capacity to absorb waste and pollution at the other. Our continued reliance on these industrial systems is pushing the world into a vicious cycle of food shortages, climate chaos, famine and disaster. How can we transform our production models for food, energy and water to deliver lower ecological and social footprints? The answer lies in using circular models that mimic natural systems to reduce both external inputs and waste. Case studies from across the world show that circular production systems can and do work for sustainability and equity. But these remain largely isolated examples. Upscaling successful circular systems for food, energy, water and waste management requires policymakers to act on seven fronts.

## From vicious cycles...

With growing populations and affluence, the past 50 years have seen massive increases in the global demand for food, energy and water. Meeting this demand has, in the main, relied on industrialised production systems that are largely linear, centralised and global in structure. So, for example, we can see a higher number of larger farms, controlled by companies and corporations, using more capital and farming inputs to produce more processed foodstuffs that travel much longer distances before reaching consumers.

The environmental impacts of these modern industrial systems are huge. From field to plate, the globalised supply chains that feed the world rely on the intensive use of fossil fuels — for fertilisers, agrochemicals, production, transport, processing, refrigeration and retailing — and are a major contributor to climate change and air pollution. In France, for example, the national food system accounts for more than a third of the country's greenhouse gas emissions.<sup>1</sup>

The energy sector has an equally damaging ecological footprint: exploring oilfields, mining uranium, building dams and logging forests all serve to degrade habitats

and emit large quantities of the greenhouse gases that fuel climate change.

The social costs of linear, centralised and globalised systems are also very high. Compared with 50 years ago, many households face much higher relative costs of food, fuel and water. The most recent food price surge in early 2011, saw the price of some food products rise by up to 200 per cent. These sharp price increases have pushed 100 million people below the poverty line; for the first time since 1970, the number of undernourished people in the world now stands at more than one billion. At the same time, another billion people suffer from obesity and diabetes through eating too much of the wrong kinds of industrially produced foods.<sup>2</sup>

The bottom line is that our current way of providing food, water, waste management and energy is unsustainable. The era of cheap energy, crude oil and natural gas is about to end. The risk of new scarcities is real because global energy demand is expected to rise by 40 per cent by 2030.<sup>3</sup> The planet has neither an unlimited supply of energy and raw materials nor an infinite capacity to absorb pollution and waste. If we continue to rely on linear, centralised and globalised production systems we will inevitably face widespread

## Policy pointers

- **Equity and sustainability** goals can be achieved by shifting from linear and globalised systems towards locally controlled circular systems that re-integrate and re-localise food and energy production with water and waste management.
- **Circular systems that mimic** natural ecosystems can be developed at different scales, from individual farm plots to entire cities, by using functional biodiversity, ecological clustering of industries, recycling and re-localised production.
- **Well-designed circular** systems can: reduce fossil fuel use and emissions; increase food, water and energy security; create jobs; boost incomes; promote resilient and self-reliant communities; and enhance direct democracy.

# It is essential that citizens and policymakers redirect investments towards circular models

ecological degradation and resource shortages on the one hand and climate change, solid waste, air and water pollution on the other.<sup>4</sup> We are spiralling ever more rapidly into a vicious cycle of food shortages, climate chaos, famine and disaster.<sup>5</sup>

## ...to virtuous circles

The imperative now is for transformation — we need production models for food, energy and water that are more climate-friendly and have much lower ecological and social footprints.

One option is to shift from linear systems to circular ones that mimic natural cycles. In these circular production systems, specialised and

centralised supply chains are replaced with resilient and decentralised webs of food and energy systems that are integrated with sustainable water and waste management systems.

They are often characterised by: agroecological approaches; a focus on ‘doing more with less’; widespread recycling and reuse; and the re-localisation of production processes and supply chains (see Two recipes for tomato ketchup).

Within agroecosystems for example, functional biodiversity subsidises food production by providing key ecological functions — recycling nutrients, harbouring wild pollinators and controlling pests — that eliminate the need for agrochemical inputs and transgenic technologies. This, in turn, helps reduce the cost-price squeeze and debt trap in which many of the world’s farmers are increasingly caught.

## Two recipes for tomato ketchup

There are more than 150 processes and transport steps involved in making the tomato ketchup that lines supermarket shelves in developed — and increasingly in transition and developing — countries. Like the systems behind many of our food products, it is highly dependent on other industrial systems, including the extraction and processing of metal ores, the production of industrial chemicals and gases, plastics manufacturing, the mining and refining of fossil fuels and industrial timber production. As such, it is capital intensive, highly mechanised and energy- and resource-intensive.

A circular systems perspective provides an elegant alternative recipe for tomato ketchup that is both ‘green’ and ‘clean’. The use of agroecological approaches to grow tomatoes locally eliminates the need for synthetic fertilisers and pesticides. In cooler climates, renewable energy — glasshouses and biogas systems — helps to increase yields and extend the growing season. Some spices are imported through fair trade. And instead of throw-away plastic bottles, ketchup is packed in re-used and sterilised glass bottles.

Overall, the number of processes is significantly fewer in this circular approach. Resource use, pollution and waste are also reduced. And there are local social and economic benefits too — less mechanisation means more local jobs, and lower production costs mean lower ketchup prices.

A defining feature of circular systems — in rural landscapes or human settlements — is a drop in the amount of waste produced: as in nature, the ‘waste’ from one process in a circular system becomes ‘food’ for another.

Some waste, such as metal or glass, can be directly reused or recycled. Biogas systems, composting and wormeries can all convert other types of waste — including organic matter, sewage, animal manure — into energy and nutrients for reuse in the system. And where recycling or reuse is not possible, as is often the case with plastics, a circular system simply opts for alternative materials.

Sustainable circular systems can be developed at different scales in both rural and urban settings — from individual farm plots to whole landscapes, and from a single urban garden to entire ‘eco-cities’<sup>4,6</sup> (see Figure).

Indeed, examples of sustainable circular systems can be found all over the world. Where these have been integrated across food, water, energy and waste, research shows that they deliver multiple social, economic and environmental benefits (see A bonanza of benefits).

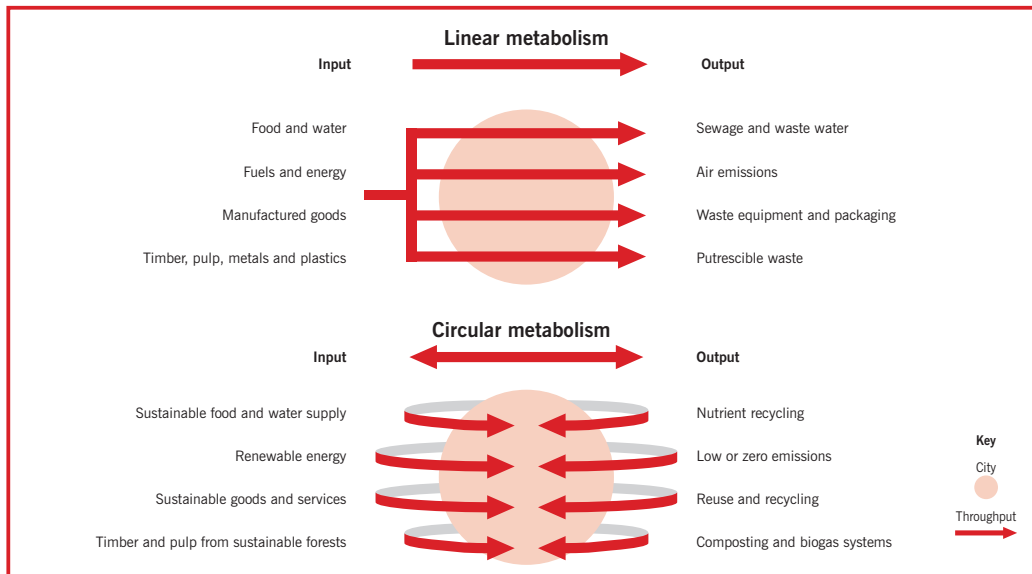
A joined-up approach can enhance food, water and energy security, boost livelihoods and reduce poverty. For example, in Ecuador circular systems that are carefully tailored to local realities by the Canastas Comunitarias movement produce and distribute a wide range of foodstuffs that provide a diverse food supply throughout the year in rural and urban contexts.<sup>4</sup> Products that cannot be supplied locally are sourced within the district or through fair trade initiatives, using sea rather than air transport. Food is processed on the farm or in small local processing units, creating jobs and livelihoods, and providing a viable alternative to dealing with the multiple retailers, exporters and middlemen associated with industrialised supply chains.

‘Re-localising’ and ‘re-integrating’ food and energy production with water and waste management in circular systems is also gaining credence as a route to enhancing the quality of life for urban dwellers — improving public health, supporting adaptation to climate change, and securing more reliable supplies of food and energy.<sup>7</sup>

And, in rural and urban contexts alike, circular systems that reduce people’s dependency on external suppliers and distant markets have also been shown to promote local citizen control over the means of production and, in so doing, enhance inclusive governance and direct democracy.

## Supportive policies

Despite the diverse range of practical examples where circular models are successfully combining food and energy production with water and waste management for sustainability, the truth is that these remain isolated



**Figure. Settlements with a linear and a circular metabolism**

Source: adapted from Girardet, H. 1992 *The Gaia Atlas of Cities. New directions for sustainable urban living.* Gaia Books Ltd, London.

examples. In most countries food, energy, waste and water management systems still rely heavily on industrial models or unsustainable resource use. Replicating sustainable circular systems on a much wider scale is now a key priority and challenge for today's decision makers and wider society.

It is essential that organised citizens and policymakers across the world simultaneously redirect investments towards integrated, resilient and locally controlled circular models, and remove key obstacles limiting the spread of these systems in rural and urban areas.

Achieving these two goals in practice requires action on seven fronts.

**1. Strengthening local organisations.** Individually and collectively, local organisations play a key role in: sustaining the ecosystems that underpin circular systems; coordinating human skills, knowledge and labour to generate economic wealth and exchanges in these multifunctional circular systems; and supporting the local governance of circular systems. Strengthening local organisations can help deliver cheaper, and more sustainable, solutions for farming and food processing, storage and distribution as well as for decentralised energy production, and water and waste management.

**2. Promoting equitable access to resources.** In the face of the widespread acquisition of land and water rights alongside the privatisation of seeds, alternative policies are needed to ensure equitable access, use and control over natural resources in rural and urban areas. Secure tenure rights play a vital role in spreading agroecological innovations and resilient circular economy models. Decision makers must abandon investment policies that favour land acquisitions and instead focus on strengthening customary tenure systems and removing discriminatory components against women.

**3. Redistributing public goods.** Integrated circular systems require investment in public goods such as

infrastructure, accessible credit and training. Dedicated funds are also needed to support the supply of local inputs — including organic manure and composting units — and local food processing facilities, such as abattoirs, solar dryers or flour mills, alongside equipment that enables decentralised renewable energy provision and water recycling and purification.

**4. Transforming research and development.** Investments in research and development must focus on building and upscaling decentralised food, energy, water and waste management systems based on circular economy models and local democratic control. This means that policies should encourage participatory research and training that emphasises the knowledge, skills and values needed to recycle, reuse and reduce resource consumption. Training centres should aim to strengthen local knowledge systems, organisations and institutions, thereby enhancing capacities for local innovation and their horizontal spread to more people and places.<sup>7</sup>

**5. Changing trade and market rules.** Farmers and other

### A bonanza of benefits<sup>4</sup>

Case studies from the Andes, Asia, Cuba and Ecuador show that circular systems that integrate food and energy production with water and waste management reduce fossil fuel consumption and greenhouse gas emissions, while simultaneously increasing food, water and energy security. Other benefits identified include:

- higher-paid, and more secure, local employment;
- increased incomes and new livelihood opportunities;
- affordable, safe and reliable energy, food and water supplies;
- less waste, pollution, vermin and disease;
- reduced dependency on, and so cost of, external inputs;
- more local and direct links between households and productive systems;
- stronger, more resilient and increasingly self-reliant communities; and
- more participation in decision making and planning.

citizens need enabling economic institutions — not only to produce food and energy but also to market their surpluses. In today's world, locally produced food, energy and clean water struggle to compete with subsidised imports. Policymakers urgently need to introduce trade rules and supply management policies that protect the local economy, strengthen self-managed cooperatives and local businesses, and provide incentives for local food and energy production. Feed-in tariffs and internal markets can encourage decentralised microgeneration of renewable energies. Similarly, the spread of resilient food systems depends on: moving away from patents on biodiversity and other proprietary technologies towards legal frameworks that recognise farmers' rights and collective innovations; replacing uniform food safety standards with a diverse range of locally evolved and managed standards; and introducing local food, energy and water procurement schemes.

**6. Penalising financial speculations and negative social or environmental impacts.** The use of fiscal measures such as tax incentives and reforms can encourage the shift to sustainable circular systems. Relatively small taxes on financial speculations and other global money transactions should be introduced through a multilateral agreement that recognises the need for strong citizen oversight. This decision alone would generate immediate and substantial funding for the design and spread of circular systems that regenerate local ecologies and economies for the public good. Policymakers should also introduce stricter, and more equitable, measures to internalise the environmental and social costs associated with the food, energy, water and transport systems that, for the most part, are controlled by large corporations. Resulting revenues should be used to support sustainable locally controlled initiatives and their federation from the ground up to enhance democracy and socioecological resilience at regional, national and global scales.

**7. Upholding citizen rights to participate in policymaking.** Governments have an obligation to support citizens' fundamental human right to participate in shaping the policies that affect them. More direct forms of democracy and much greater citizen engagement in framing policies and institutional choices can be encouraged by simultaneously strengthening civil society, encouraging deliberative and inclusive policy processes, expanding information democracy, nurturing

active forms of citizenship, and learning from the rich history of direct democracy.<sup>8</sup>

Policies also need to facilitate legal redress against abuses — not least because citizen participation increasingly takes place against a backdrop of transnational corporations and investors engaging in international arbitration to protect their rights as investors. For the first time in international law, large corporations are being given the right to sue governments.<sup>9</sup> Citizens require safeguards against such abuses of power. The newly adopted Optional Protocol of the International Covenant on Economic, Social and Cultural Rights (CESCR) offers real opportunities as an international complaints mechanism. For example, the protocol greatly improves access to justice for citizens whose right to food has been violated because it enables individuals or groups to bring a complaint directly to the CESCR.<sup>10</sup> Still, in many cases legal redress will not be enough — history everywhere shows that human rights will need to be claimed through the agency and social mobilisation of local communities and wider coalitions of citizens.

## Rio+20 and beyond

As state officials gather in Rio de Janeiro for the 2012 UN Conference on Sustainable Development (Rio+20), they will need to adopt as a key policy objective the rapid development of sustainable and equitable food, energy and water systems based on circular economy models.

This includes designing institutions, policies, and technologies that support and sustain locally controlled circular systems capable of self-renewal and high production in rural and urban contexts. Over the next 20 years, this process should aim to significantly reduce the carbon and ecological footprints of wasteful consumption and production models, increasing food and energy sovereignty at the local level.

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## Notes

- <sup>1</sup> Jancovici, J.M. 2010. *Combien de gaz à effet de serre dans notre assiette?* See [www.manicore.com/documentation/serre/assiette.html](http://www.manicore.com/documentation/serre/assiette.html)
- <sup>2</sup> Lang, T., Barling, D., Caraher, M. 2009. *Food Policy: Integrating health, environment & society*. Oxford University Press, Oxford.
- <sup>3</sup> IEA 2009. *World energy outlook*. International Energy Agency (IEA), Paris.
- <sup>4</sup> Jones, A., Pimbert, M.P., Jiggins, J. 2011. *Virtuous circles: Values, systems, sustainability*. IIED and IUCN CEESP, London.
- <sup>5</sup> UNEP 2012. *Global environment outlook (GEO-5): Environment for the future we want*. UN Environment Programme (UNEP), Nairobi.
- <sup>6</sup> Girardet, H. 2008. *Cities people planet: Urban development and climate change*. John Wiley & Sons.
- <sup>7</sup> Pimbert, M.P. 2007. *Transforming knowledge and ways of knowing for food sovereignty*. IIED. See <http://pubs.iied.org/14535IIED.html>
- <sup>8</sup> Pimbert, M.P. 2010. *Reclaiming citizenship: empowering civil society in policy-making*. In: Pimbert, M.P. *Towards food sovereignty: reclaiming autonomous food systems*. IIED, London. See: <http://pubs.iied.org/G02612.html>
- <sup>9</sup> NJGI. 2011. *Call for an Alternative Investment Model*. Network for Justice in Global Investment (NJGI). See <http://justinvestment.org/2011/11/call-for-an-alternative-investment-model/>
- <sup>10</sup> Ziegler, J. et al. 2011. *The fight for the right to food: lessons learnt*. Palgrave Macmillan, New York.



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