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An Economic Instrument for Zero Waste, Economic Growth and Sustainability

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About the author

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Abstract

If global problems such as climate change and waste remain unresolved, society can choose either to continue attempting to incrementally reduce wastes and lessen impacts, or to consider a more ambitious approach which paradoxically may be easier to implement. This paper suggests how an approach aiming to prevent waste and other global impacts could be based upon the established practices of precycling, circular economic policy and recycling insurance. A new economic instrument called ‘precycling insurance’ is proposed, so that decision-making can be led by the market rather than by prescriptive regulation or educational campaigns. The approach gains relevance now that China is developing a national ‘Law on the Promotion of the Development of Circular Economy’.

Keywords: sustainable, economic growth, zero waste, prevention, precycling, insurance, systems thinking.

1. Introduction

More than 30 years have passed since the United Nations Conference on the Human Environment met in Stockholm to discuss the risk of ‘massive and irreversible harm to the earthly environment on which our life and well-being depend’ [1]. A vast array of strategies,

tools and practices have since been used to address social and environmental impacts. Meanwhile the amounts and types of wastes which are not processed back into new resources have vastly increased, and protection against the risk of massive and irreversible harm has not been achieved. In other words the incremental approach of minimising impacts has not worked and should be replaced with another. This paper proposes an approach which aims to prevent rather than just reduce accumulation of wastes. Old products would become new resources for the economy or for nature. Resource scarcity would be replaced by resource abundance, with benefits for technological, economic, environmental and social progress. This approach can be implemented practically with an economic instrument based upon insurance rather than government taxation. The proposed instrument would enable the market to guide decision-making, rather than relying on individual ethics, government prescription or single-issue campaigning.

Section 2 of this paper examines how the incremental approach paradoxically has become harder to implement than the more ambitious preventive approach. Section 3 suggests a compatible goal-set (a circular economy) and actions (precycling) to achieve the goal-set. Section 4 proposes a suitable economic renewal (based on precycling insurance), and section 5 explores how to start. All aspects of the preventive approach require further research.

2. From an incremental approach to a preventive approach

Although nations differ in their enthusiasm for applying environmental policies, they share a common approach of incremental improvement. The aim of the approach is to gradually reduce the impacts of problems. Problems are managed how they are perceived - in terms of their impacts. During a time when the world's problems were fewer and simpler the incremental approach seemed to be successful. Some impacts in some places (for example acid rain, CFC emissions and river pollution) have benefited from incremental improvements. However other major impacts (for example climate instability, poverty, disease and use of violence) have worsened [2]. The world's problems are now numerous and relentlessly interconnected. Today's choice is whether just to try harder or to try a new approach.

2.1 Less bad is not good enough.

Thirty years is sufficient time to test an approach; if incremental improvement was going to work for major global problems it would have done so by now. Will more effort to reduce emissions and discharges reveal these as symptoms of problems, not causes? Will greater

prediction of impacts show how they can be prevented? Will further prescriptive regulations targets inspire and enthuse business and industry? Despite the large and expensive international effort to emit less carbon, economic reliance on fossil fuels, conflicts over access to oil and the costs of climate-related disasters have all risen. Lucrative tax revenues from fossil fuels undermine leadership by governments and rising fuel prices generate short-term profits rather than long-term investment in substitutes which do not become wastes. The public are asked to save energy but not to imagine life with fuels that return as new natural resources.

The incremental approach was a valid starting point for action on global problems. It generated much discussion and evidence about impacts and stimulated useful actions. However, when problems are numerous and highly complex, levels of participation are limited by large volumes of conflicting information and by people's aversion to uncontrollable gloomy scenarios. A common hope among environmentalists is that more people will act if climate change and other impacts worsen sufficiently. However there is also the risk that worsening impacts can fuel argument rather than consensus. If the urgency of any one problem becomes overwhelming, rushed law-making may substitute for democratic engagement.

2.2 Seeking a new approach

Preventing impacts is more ambitious than reducing impacts, yet if difficulties with the incremental approach can be avoided then paradoxically a preventive approach may be more manageable and effective. This challenge effectively defines how a preventive approach should work, by addressing underlying systemic problems rather than symptomatic impacts. This involves less complexity and less information, permitting widespread participation. Economic interventions should be designed to work with a wide range of issues and situations, with fewer and less-prescriptive regulations. Prices of products and services should be kept affordable by investments which successfully prevent growing security, health, refugee, pollution and resource-availability expenses. A culture of cooperation with nature and between people should become more viable.

2.3 Economic growth, sustainability or zero waste?

'Zero waste' commitments have been made by: numerous provinces worldwide, including in California, Nova Scotia (Canada) South Australia, Victoria, Western Australia, New Zealand, Lebanon, Taiwan and China; and by growing numbers of businesses including DuPont, Fuji Xerox, Collins Pine, Ricoh, Konika-Minolta, NEC, Toyota, Hewlett Packard, Epson and

Interface. This demonstrates widespread progress with preventive thinking, technical achievement and exemplary initiatives. However, the goal of zero waste is frequently sought incrementally: no waste becomes less waste in practice. A preventive approach needs more than just a preventive goal.

Terms commonly used to describe societal goals are not ideal. Economic growth is conventionally sought in ways which undermine sustainability (by impacts experienced globally) whilst sustainability is conventionally sought in ways which undermine economic growth (by prescriptive over-regulation). ‘Sustainability’ and ‘sustainable development’ are little used by the public and are routinely misused by organisations seeking approval for incremental improvements. ‘Zero waste’ is often misinterpreted as unrealistic since it cannot be achieved with today’s economic signals, though it could work on a global scale with different signals. Zero waste and sustainable development are widely-used expressions of attempts at a preventive approach. It is less well-recognised that economic growth could also be compatible with a preventive approach. In fact the counter-productive competition between economic, social and environmental goals illustrates the need to review and adapt (rather than balance and compromise) societal goals. Reconsidering societal goals invites flexibility of mindsets and world-views which is the strongest possible intervention in complex systems [3].

3. A goal-set and actions to achieve the goal-set

With the incremental approach, plans are often made with weak links to long-term goals. Current trends are identified and actions are chosen with the aim of improvement. This planning method is known as ‘forecasting’. A preventive approach uses ‘backcasting’ [4] whereby planning starts with goals rather than with the current situation. Backcasting can be compared with travelling towards a mountain destination, rather than just away from the thickest nearby jungle. Backcasting helps ensure that actions to reduce current impacts do not obstruct actions to meet long-term goals.

The economist Kenneth Boulding described the proposed goal-set in 1966: a ‘circular economy’ is a long-term aim compatible with economic growth, sustainability and zero waste. Actions to implement a circular economy are suitably described with a word first used by the social marketing executive Maureen O’Rorke [5] in 1988 - ‘precycling’. This combination of aims and actions provides a basis for societal dialogue, economic renewal, planning and daily decision-making.

3.1 Aiming for a circular economy

Resource management is tangible and easy to discuss so it is ideal for defining goals. Though resources are the starting point of the goal-set, all major global challenges involving nature, geological deposits, society and the economy are connected. Boulding's colleague Fred Polak [6] wrote; 'There is a great deal of historical evidence to suggest that a society ... which loses its positive image of the future loses also its capacity to deal with present problems'. The global decline in hope for the future [7] suggests a need for a more robust image of the future than economic growth and incremental improvements. An effective image of the future would also support practical decision-making: 'Decision involves images in the mind of alternative futures.... Behaviour then consists of acting in a way that is expected to realise the image of the most preferred future.' - Boulding [8].

Boulding [9] contrasts a linear or 'cowboy' economy (which acts as though the world receives a flow of fresh resources and can dispose of wastes) with a circular, cyclic or 'spaceship' economy (which observes that the world is effectively closed to matter). Boulding notes that the linear economy is characterised both by environmental impacts such as pollution and by social impacts such as exploitative and violent behaviours. In modern times a wide range of inter-related impacts are observed, such as extreme inequalities, population expansion, urban sprawl, disease pandemics, public and personal debts, psychological stress and depression, overeating, overworking, unemployment, overuse of alcohol, tobacco and other drugs, suicides, failing pension systems, rising taxes, over-regulation, materialism, alienation, distrust, refugees, erosion of civil liberties, military occupations and terrorism. According to Boulding, attention must be given not only to symptomatic 'immediate problems' but also to 'a long-run vision of the deep crisis which faces mankind'.

There are strong links between linear economies and anti-social activities (such as a need to compete for scarce resources and insufficient hope for the future) and there are examples of waste-preventing tribal societies with high levels of social cohesion. However, the complexity of interactions precludes definitive cause and effect links for specific impacts. When dealing with complex whole systems it is less relevant to seek causes and more useful to seek 'leverage points' [3] where a change allows the system to correct itself. The most convincing proof of the viability of a high-technology high-cohesion circular economy would be its achievement.

3.2 The circular economy in national policy and environmental education

Variations of Boulding's language are widely used in teaching, research and even in the

policy of Germany, China and Japan. For example China's National Development and Reform Commission [10] includes a 'circular economy' policy in the country's 11th five year plan (for 2006 to 2010). 'China ... will comprehensively and systematically promote a policy for integrating the Circular Economy closed-loop into socio-economic systems.' Five eco-demonstration provinces or cities are piloting local initiatives, 13 eco-industrial parks have been established and a national 'Law on the Promotion of the Development of Circular Economy' is being drafted. It is not yet possible to determine if China will follow a rebranded incremental approach or if it will lead a new form of industrial economic growth.

The distinction between linear and circular economics was used by Karl-Henrik Robèrt [11] 15 years ago to found The Natural Step educational organisation. 'Most environmental problems are based on the same systemic error - linear processing of material. Until resources are processed in cycles - either by society or by biogeochemical processes - the global economy and public health will continue to deteriorate. Consequently, we will never be in a better position than we are now to make the necessary changes; every minute we delay increases the final cost.' A framework for decision-making which uses backcasting to plan for circular organisations was also developed 15 years ago by The Natural Step [12], together with their network of scientists and business-people. The communication of this framework could be adapted to make it faster to learn and easier to use, potentially making it available to all decision-makers.

3.3 Precycling - action to prevent waste

Most of the above goal-set has been available for almost 40 years, without achieving a shift in the world's dependence on linear economics. The goal-set is easily sidetracked into plans to reduce impacts, which then prove to be insufficient. Two 'missing ingredients' are proposed: a term to describe actions towards the goal-set; and an economic instrument to stimulate those actions (see section 4 below). The English language is well-stocked with terms to describe actions which reduce impacts, such as nature conservation, recycling, energy taxation, debt relief and environmental awareness. However there is no popular term for the range of actions involved in achieving a circular economy. This term should describe resource-use but involve the whole society, economy and environment. A suitable word is 'precycling', meaning actions taken now to prepare for current resources to become future resources, rather than wastes accumulating in the biosphere. Such actions deal with waste before it can add to existing wastes in the air, land or waters. Precycling covers a wide range of actions by a wide range of actors which both prevent problems and strengthen the economy.

Precycling: actions taken now to prepare for current resources to become future resources, rather than wastes accumulating in the biosphere.

The term ‘precycling’ was first used in a public awareness campaign for a Californian local authority to persuade residents to cut solid waste by careful purchasing choices. Precycling was highlighted as one of ‘50 simple things you can do to save the Earth’ in a book selling over 700 000 copies during 1989 [13]. The U.S. Environmental Protection Agency (EPA) [14] emphasised the need for precycling. ‘EPA cites precycling as the preferred method of integrated solid-waste management because it cuts waste at its source. Trash is eliminated before it is created.’ In 2005 precycling is employed within waste prevention campaigns in approximately 20 districts of North America.

3.4 Action to prevent a range of problems

The scope of people’s understanding of precycling has expanded over time to cover product-focused actions by householders, local authorities, retailers, business and industry - Baldwin [15]. Precycling can now comprise all actions which build the industrial, social, environmental and economic circumstances for old products to end up as new resources. The infrastructure of reduction, reuse, recycling, remanufacture, composting and gasification/ pyrolysis can be extended so more products can become new resources. Industrial independence from known accumulative substances (persistent synthetics, heavy metals, fossil fuels, radioactive substances) can be raised so these too can be precycled by substitution. Ecological habitats can become more extensive and diverse so more emissions and effluents can return as natural resources. Society’s capacity to meet everyone’s needs can be expanded so everyone can precycle. The economy can become increasingly circular so that economic, environmental and social goals can be met in parallel. On a ‘precycled planet’ new resources for people or for nature could be created at a similar rate as today problematic wastes are created.

Many actions which reduce impacts are forms of precycling. Recycling, for example, is one way to precycle since action is taken before the materials are abandoned to nature. Precycling is however more ambitious than recycling. Whilst only some products can be recycled, every product can be precycled by correcting whatever error allows it to become waste. This may require new designs, better facilities, new skills, improved customer contact, ecological expansions, substitution with a more advanced product or even meeting the need without any product. Precycling can work on a small scale since every household, business or locality can precycle some products. Everyone can avoid purchasing ‘rubbish’ and can seek new homes for materials which are no longer needed. Precycling offers a shared

language for experts and non-experts, buyers and sellers, economists and environmentalists. The goal of a circular economy and the practice of precycling can help raise expectations of what is possible.

4. Economic renewal and a process to achieve economic renewal

A campaign to promote circular economics or precycling, even with massive funding, could disappear amidst today's information clutter. However any government declaring a possible new economic policy can guarantee strong interest and a lively debate (as is happening in China). Thus the most effective way to promote precycling would be to launch a consultation on a circular economy. Without possible economic change, the public is highly unlikely to believe that government is serious about a circular/zero waste/economically sustainable future. On the other hand, without support from business and the public, democratic governments cannot proceed to implement a new instrument. This section outlines a suitable economic instrument and section 5 discusses how to start.

4.1 Correcting market failure

The effectiveness of markets for distributing resources and meeting people's needs depends upon prices accurately reflecting both the internal costs of providing the product and the external costs of problems linked to the product. Accurate prices gives a 'level playing field' on which all current and future players (stakeholders) are fairly treated. Markets account well for internal costs but market failure with externalities is so pervasive that it is commonly ignored. Economic externalities such as the prevalence of unfair or fraudulent deals and the concentration of wealth leave more than one billion people existing on less than one dollar per day. Environmental externalities include rising concentrations of numerous wastes and progressive loss of biodiversity and habitat. Obesity, stress, depression, the diseases of poverty and a tendency towards violence are examples of social externalities. The incremental approach tackles externalities symptomatically and separately, with a mounting burden of prescriptive regulation that is opposed by business. This makes the current approach to externalities self-limiting, and international agreements particularly slow to progress.

There are four basic options available for instruments to correct prices and account for externalities:

(i) Taxes and other government charges. Taxes are already rising in most economies, due to the mounting costs of accumulating impacts. Additional rises to correct prices are politically

unrealistic.
(ii) Regulation. This is a prescriptive instrument which is expensive to administer and enforce.
(iii) Tradable permits. This is a variation of regulation which sets limits and uses specialist permit-markets to distribute quotas. This instrument is rather complex to be widely understood or accepted.
(iv) Recycling insurance. Producers use this private-sector service to guarantee the future costs of recycling their products.

4.2 Recycling insurance

The fourth insurance-based option is contained within the European WEEE Directive [16]. 'When a producer places a product on the market, he must furnish a guarantee concerning the financing of the management of his waste. Such a guarantee may take the form of participation by the producer in financing schemes, a recycling insurance or a blocked bank account.' Recycling insurance was first sold by a Swedish insurer Lansforsakringar Miljo [17], as a service for producers with products requiring end of life recycling. Instead of arranging the recycling themselves producers can buy this insurance, which guarantees payment of all future recycling costs. The price of the insurance depends upon the recyclability of the product. The company has sold policies for a range of household and commercial durable products, including 30 000 cars from Mazda and Suzuki. The price of the recycling insurance becomes part of the product purchase price, which allows fair competition in the market between recyclable items and unrecyclable items. Producers gain an incentive towards recyclability (including elimination of hazardous parts) and users gain guaranteed end of life recycling. Loss of the resources as waste is prevented, along with risks such as pollution from dumping or incineration.

The entire industry of insurance began by avoiding losses, rather than just paying for losses. The world's first insurance service [18] in London in 1680 did not pay claims from fire damage, but funded fire brigades. Today the world faces numerous problems which are global and inextricably interconnected, so that it is rarely possible to retrospectively allocate blame and claim compensation. Sooner or later it will no longer be possible to use conventional insurance, charity and government funds to pay financial costs of worsening impacts. Using figures from Munich Re [19] up to 1998 Andrew Dlugolecki [20] considered just climatic impacts, '...the rate of increase in economic losses from all types of natural disasters rose at an annual rate of 12% between the 1980s and 1990s, and the rate of increase is itself increasing. If one contrasts this against a conventional GDP growth rate of 3% per year for the global economy, a 'cross-over' occurs whereby the losses from climate-

related losses will exceed the world GDP in the year 2065.' This situation can be avoided only with economic measures which systematically prevent problems rather than pay for them afterwards.

4.3 From recycling insurance to precycling insurance

The practice of recycling insurance is suitable to generalise into a market correcting economic instrument for implementing a circular economy:

(i) The full range of products can be covered.

(ii) Participation can be obligatory for the full range of producers, which maintains fairness and stimulates improvements.

(iii) The full range of opportunities for preventing waste and problems can be financed.

Funding of technical resource cycles is just one precycling opportunity. Other opportunities include remanufacture, redesign, substitution, phasing out, more efficient or alternative ways of meeting needs, local repair/reuse, expanding ecological habitats to biodegrade substances and building society's capacity to meet everyone's needs. All forms of precycling could be supported with a generalised form of recycling insurance called 'precycling insurance'.

Government would be needed to legislate and monitor a precycling insurance scheme, as with any economic instrument. However if government also collects and invests premiums, it would unavoidably be perceived as extra taxation. Precycling insurance is clearly not a tax, since producers may reasonably be expected to be responsible for their own products and not to impose avoidable costs on society. The cost of premiums is shared throughout society by the market, not by government. A scheme could be operated by insurance businesses or not-for-profit organisations. Insurance businesses are well-qualified by their experience in calculating risks, managing investments and appreciating the need to prevent problems. Although precycling insurance would cut claims to their other business, it remains to be seen if the insurance industry will choose to diversify into tackling impacts before they happen.

4.4 Calculating precycling insurance

Precycling insurance would match premiums to the risk of a product ending up as waste rather than as a new resource for people or nature. Premiums would fund actions to prevent that risk by precycling. Products with a negligible risk of becoming waste, such as bars of soap, gold and silver jewellery or aluminium beer kegs, would attract negligible premiums. The waste risk would be small when: products are easily recyclable or biodegradable; the producer has invested in end-of-life processing; and the product is not already accumulating

in the land, atmosphere or waters. This last factor addresses acute impacts from known accumulative substances such as heavy metals, mineral fuels and persistent synthetic compounds (CFCs, PCBs, DDT, etc). Using precycling insurance and normal market forces, fuels, heavy metals, pesticides, cars, houses, sofas (and everything else) could become quickly compatible with a circular economy. Large economic, social and environmental losses could be prevented by including the smaller cost of prevention within the purchase price, whilst giving new market opportunities and maximum freedom of choice to manufacturers.

Factors to calculate waste-risk and precycling insurance premiums:

a) Recyclability or biodegradability.

b) Producer's provision for any infrastructure, habitat or collaborations needed to regenerate the product as new resources.

c) Existing ecosystem concentrations of product components above natural levels.

4.5 Effects on business

Precycling insurance makes sense from a business perspective. It would:

(i) add to economic vitality by stimulating large new investments and new markets;

(ii) minimise prices by preventing the shared costs of further worsening of impacts;

(iii) lessen the prescriptiveness and administrative burden of a wide range of regulations;

(iv) apply the same corrective measures fairly to every product;

(v) create a level playing field which rewards social and environmental responsibility;

(vi) reduce the risks of economic shocks from preventable impacts;

(vi) remove the need to blame business for problems; and

(vii) improve prospects for business-people, along with everyone else.

There is a large and growing tangle of complicated waste and pollution regulations constraining business. According to Hermann Horstkotte [21]: 'Waste avoidance is still the best method to prevent a waste 'attack'. Perhaps it would then also be possible to loosen the mass of tight regulations relating to waste: There are currently no fewer than 800 laws and nearly 5000 ordinances relating to waste in Germany.' Almost all waste regulations could be simplified or replaced with precycling insurance, allowing a vast reduction in the costs of compliance by business. Businesses could choose how and even whether to ensure that their products end up as waste. With the help of corrected prices in the market, producers could largely self-regulate. Product precycling plans and precycling insurance calculations should be available online for public scrutiny and suggestions for improvement.

4.6 Examples of effects on the economy

Makers of complicated items with many different parts (including packaging) would not be unfairly affected since each part is in itself a product with precycling insurance and any material need not be precycling-insured twice. A complex item within a working recycling infrastructure might have a negligible risk of becoming waste and attract negligible insurance. Since the instrument is non-prescriptive a producer may also choose to make something hard to recycle and to invest nothing in infrastructure, so paying higher precycling insurance and selling at a higher price on the market. Another producer may substitute a product (such as pesticides) by a service (such as pest predator information), which avoids premiums. Disposable items which are reliably recycled or composted would also attract negligible premiums. Precycling premiums on currently wasted items such as disposable nappies, dirty plastic, chipboard and composite materials could fund technical solutions, such as pyrolysis/gasification, which are currently unaffordable. Persistent synthetic substances such as CFCs, PCBs and other non-biodegradable chemicals which leak into nature and/or people and cause rises in concentrations would pay higher premiums which could fund use of replacement products and possibly also clean-up work. Producers whose products become litter, such as chewing gum on pavements, would become financially motivated to collaborate in solving the problem.

Precycling insurance provides a new economic incentive to focus more carefully on the needs being met in order to profit from durability, repair, refurbishment, reuse, leasing, substitution and other options which reduce waste. Focusing on stakeholder needs rather than just selling more products is a powerful stimulus to innovation, efficiency and good communication. Producers with waste-free product/service proposals would increase sales and gain market share. Since human needs are unchanged, old markets are not lost - only the products and services change. People will always need warmth, even when this is no longer supplied by fuels which become waste. The total material requirement of the economy would fall but economic growth could be maintained due to the high level of new investments and large new resource regeneration sectors. Government spending on waste treatment, regulation and the numerous expensive impacts of a linear economy should fall, enabling lower taxes. The balance between labour costs and material costs would shift, making recycling, repair, refill and reuse more viable. At the local level, precycling funds could support community initiatives which raise participation by establishing local material cycles, skill-sharing and give-away of unwanted items. Waste dumps would become resource sites. Waste-dependent industries and communities would receive practical support and information whilst swapping ideas and comparing plans.

4.7 Examples of effects on the environment

Nature conservation is currently a losing battle since the steady dismantling of nature and the loss of resources as wastes is available for free to today's linear economy. A circular economy would recognise the need to maximise nature's productive capacity to reprocess all the biodegradable wastes (emissions and effluents) of industrial and human activity. Precycling insurance would provide funds to invest in systematic preservation of endangered habitats, careful harvesting of biological resources and expansion of productive ecosystems. Large flows of organic material which currently cause pollution and waste impacts would be returned into newly fertile soils to provide better food, natural resources and green spaces.

Use of mineral resources would become compatible with a circular economy. Fossil fuels, nuclear fuels and heavy metals are difficult or impossible to use in ways which prevent them becoming wastes, since the geological cycles that redeposit them into the Earth's crust (as new mineral resources) are so slow. However precycling insurance would fund work to avoid the need for accumulative minerals, by efficiency improvements and substitution. Since all fuel sources should be included it is possible to avoid the folly of expensively swapping between fuels which accumulate as wastes. Funds could also support public dialogue about the future of fossil fuels: should they be burnt or are they more valuable buried, to preserve the planet's suitability for life? For climate change, precycling insurance offers a flexible alternative to politically unrealistic alternatives such as binding limits on greenhouse gas emissions and international taxation on mineral fuels.

4.8 Examples of effects on society

In a linear world where wastes endlessly accumulate it is difficult to be hopeful about the future. Declining hope, declining resources and growing populations make competitive struggle unavoidable. This is the background for a wide spectrum of uncooperative behaviours from bad manners and cheating to terrorism and wars. Such behaviours have been highly resistant to change despite massive spending on 'security', police, prisons and weaponry. The introduction of precycling insurance would signal a shift to a circular economy making resources instead of making wastes and abundance in place of scarcity. Problem-prevention, resource-availability and fuller participation supports hope for the future and scope for a more cooperative culture. A 'circular society' (operating a circular economy) is not Utopian, however. Biodegradable chemicals can still be toxic. A less violent world would still need military and police. If poverty becomes history, wealth inequalities may not. Reduced regulation still requires bureaucracies. Car and air travel could continue.

4.9 Product labelling - a further practical tool

A wide range of official and unofficial environmental product labels are used to indicate possible advantages to potential purchasers. Unofficial labels typically draw attention to a single claim such as ‘recyclable’, even when users find no recycling facilities. Official labels typically consider a range of environmental impacts over the lifecycle of the product, although there is still no guarantee that the product is compatible with a circular economy. Household energy-efficient light bulbs containing the heavy metal mercury are awarded official eco-labels without provision for recyclability or recycling facilities. The technical complexity of the Life Cycle Analysis contributes to slow administration of awards, prohibitive fees and public confusion.

Product labelling can be based not on measurements of impacts but on compatibility with a circular economy. Whilst precycling insurance can give buyers correct prices, a ‘precycled product’ label can show buyers which products will not become waste. The judgement about which products are eligible for the label is so simple as to be almost automatic. A maximum level of risk of a product becoming waste is set by the responsible government body. This waste-risk would have been calculated already for precycling insurance and would be available online. Any product with less than the qualifying waste-risk could use the label. The label could be launched with a high waste-risk threshold which may be lowered as the economy progresses. The label would be easy for consumers to understand: “this product should not become waste”. The label would usefully include end-of-life instructions, a telephone support number and a web link to the product’s precycling plan, including repair and recycling manuals.

4.10 Precycling pension - a further practical tool

Neither conventional insurance nor conventional pensions can help with future global problems which are preventable but unaffordable. Providers of precycling insurance would manage funds which invest in measures to improve everyone’s prospects. These funds could also operate a ‘precycling pension’ service investing in precycling to prevent problems which increasingly interfere with retirement. The benefits of precycling investments would be experienced globally, rather than individually, so a precycling pension would be suitable for those individuals having a surplus (above their conventional pension needs) available to protect and enhance their future.

5. Starting economic renewal

5.1 Awareness without change

Since the 1972 United Nations Conference on the Human Environment in Stockholm expressed the need for an international framework for environmental education, there have been countless educational initiatives about environmental and social impacts. Today these issues are constantly in the mass media and the global effort to raise awareness of impacts can be declared a success. Phenomenal volumes of information have been generated, though information and awareness has not transferred into the necessary actions on a significant scale. Information does not equate to dialogue, and raising awareness does not equate to changing behaviour [22].

The challenge of stimulating changes which support society's long-term goals has been underestimated. There is psychological discomfort between a changing individual (or individual business, locality or nation) and the unchanging wider world [23]. Large sections of the public avoid this discomfort by fatalism, denial or token actions. However the availability of an economic instrument which could change the world makes the task of engaging the global population more manageable. A process of engagement may be separated into two stages: before and after starting economic renewal. In the first phase before economic renewal all that is needed is sufficient public support for political leaders to introduce precycling insurance. Changes in behaviour (more precycling) may arise spontaneously but in phase 1 the central aim is the purpose and practice of economic renewal. Any nation starting the process of economic renewal (phase 2) can then allow a new view of the future and new economic incentives to support further engagement.

5.2 Phase 1, before starting economic renewal

Since the causes and effects of linear economics are global, the strongest protection from problems requires global participation in circular economics. If economic renewal becomes the subject of international agreement (with either few or many product types) it also would avoid complications with imports and exports. If not then precycling insurance can operate with any number of countries and any number of product types. A key opportunity is for precycling insurance to implement the expansion of producer responsibility rules which is observed in many economies. It would be worthwhile starting with fuels to avoid encouraging inefficient or long-distance methods of handling waste.

Even before precycling insurance exists it is possible for any city, company or individual to precycle. Eliminating sources of waste and preventing problems already makes sense and is

already often cost-effective. Educational institutions can explore the relevance of a circular economy and precycling. Climate change projects can discuss the effect of precycling insurance on fuels. Free-trade organisations can promote a new possibility for reduced regulation and greater commercial freedom of choice. Households can precycle many items by their choices in purchasing, looking after and passing on products. Designers can already shape products and processes which prevent wastes, as explicit examples to politicians of what is needed everywhere. Businesses and communities can manage waste before it is created rather than just dispose of it afterwards. Precycled product labels and precycling pensions could also precede precycling insurance, to stimulate debate.

An example of dialogue on a global scale was the Jubilee 2000 debt relief campaign [24], the first global petition. It was started by one person in 1996 and four years of campaigns in more than 60 countries produced countless discussions and 24 million petition signatures. Leaders of seven wealthy nations agreed to write-off $110bn of poor country debts, and debt was launched on the global political agenda. Politicians cannot act without popular support so precycling insurance will need some form of popular effort in democratic countries.

5.3 Phase 2, after starting economic renewal

Assuming the future success of phase 1 and steady implementation of economic renewal, progress towards a circular economy would be driven by market signals, in the same way as today's market inadvertently supports linear economics. A useful framework for guiding decisions could be developed from work by The Natural Step. This framework could support individual or group planning which starts with the desired goal-set and presents all relevant factors visually, allowing all possible precycling mechanisms to be considered. Versions of the framework could support different sectors of society, from government to households. In this complex world problem prevention is far simpler than problem reduction, so it should be possible for everyone affected by changes to take part in deciding them. Local decision-making may no longer require volumes of government dictat or expensive consultancy. Governments should be able to focus on acute impacts, policy-making and monitoring whilst precycling insurance schemes should prioritise preventive investments. Phase 2 could proceed faster than may be expected today when the power of the market stimulates the vast reserves of human ingenuity to prevent problems.

6. Conclusion

It is ironic that the world's efforts to reduce its problems may be blocking a preventive

approach. Zero-waste, sustainability and continuing economic growth may not be achievable as they are currently practised. The proposed alternative appears to be viable and practicable; however it does invite a change of mind-set. People are wonderfully inventive and have changed the face of the world, yet it remains to be seen how easily minds can change. Most of the world's people are already affected by a growing list of worsening impacts and there is no guarantee that all such impacts will remain tolerable until everyone is ready. As Karl-Henrik Robèrt [11] concluded 15 years ago, "Consequently we will never be in a better position than we are now to make the necessary changes".

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