China's Industry Academia Research Collaborative Promotion Association - CEB

**Reinforcing circular economy promotional laws and the treatment of white pollution**

Forum, Beijing 14-15 December, 2008

# How EDUI may promote innovative approaches to China's 'Circular Economy' using international connections

**Dr David Ness**
**Executive Chair, EDUI**
**Adjunct senior research fellow, University of South Australia**

## 1. Main message

This talk will discuss how the recently established not-for-profit organisation, Ecological Development Union International (EDUI), may promote innovative approaches to the new Circular Economy law, using its international connections. EDUI aims to 'develop a clean, resource efficient and recycling economy', which has much in common with the Circular Economy, as does the concept of Factor 4 (doubling prosperity, halving resource use) introduced by Prof Ernst von Weizsaecker et al (1998), who is now advocating a Factor 5 shift in resource productivity. The UN 'Green Growth' agenda is another in this suite of strategies. EDUI was 'born' about a year ago, now it is timely to consider how EDUI may support the circular economy, with consideration to the special role of EDUI, and its relationship to the CEB. EDUI could perhaps focus on promoting the concept of service economy, and how this may enable prosperity via services not goods production. This talk highlights some examples of innovations that may have not only environmental but also social and economic benefits, including sustainable product services and how this may support social development of communities. Some comments are made on applying these approaches to addressing 'white pollution.

## 2. What is the essence of the circular economy?

The circular economy concept, 'green growth', Factor 5 and the EDUI aims all have one theme in common. This is to achieve more output, with less input. In other words, to do more with less; to enable social and economic development (so necessary for poverty alleviation) but with less use of material, energy, water and land resources, less environmental impact in terms of waste and emissions, and with less cost (see Ness 2008). To crack the code to 'decouple growth from resource consumption', one of the major challenges facing humankind today. To achieve a 'win, win, win' in terms of people, planet and prosperity.

As stated by Ni Yuefeng, NPC Standing Committee member, when China passed the circular economy law on 29 August 2008, 'developing a recycling economy will help the country to achieve a maximal economic efficiency through minimal energy consumption and emissions'.

According to the law, 'the central government will allocate funds and capital to enterprises to encourage innovation in recycling technologies'. Clearly, innovation is the key, with a fundamental task being to inspire the enthusiasm and creativity of S & T personnel (Prof Xu, 2006). I would like to add to this: 'and to inspire the enthusiasm and creativity of the general populace, to touch their hearts and minds'.

In addition, to achieve a clean, green, circular economy will require a very significant transformation of the skills base, and this was highlighted in a recent Australian report 'growing the green collar economy' (CSIRO 2008). The report urged 'mobilising – on a massive scale – environmentally relevant skills throughout the Australian workforce', and similar principles are likely to apply to China and other emerging economies.

**3. Importance of knowledge innovation and integration**

It is widely recognised that, in order to achieve necessary growth and development without damaging environmental impacts, China needs to 'leapfrog' the industrialisation practices of the west. To do this will require a major shift in thinking and practices, with reform and innovation being fostered through 'scientific development'. As Prof Xu Guanhua said (2006), the new generation of China's S & T should follow the principle of 'indigenous innovation, leapfrogging in key areas, underpinning developments and setting the direction for the future'. President Hu Jianto has emphasized that indigenous innovation should be on top of the agenda of all S & T endeavours, with capacity building for innovation as the core of structural realignment and the national competitiveness. Prof Xu said, China should 'learn from the advanced technologies from various countries while adhering to indigenous innovation as the basis for S & T advancement'.

At the recent G8 University Summit, Prof Hiroshi Komiyama, President, University of Tokyo, highlighted the importance of integrating disciplines and approaches in achieving innovation.

**4. EDUI role: innovation through connections**

EDUI may assist China to build its own indigenous innovation capacity, building upon and extending advanced thinking throughout the world. By building its own innovation capacity, China may take the lead, acting as an 'innovation hub' and providing an example for other developing countries in its region (see Huang et al 2008).

EDUI may draw upon leading world-wide knowledge and bring this to bear on the challenges faced by China. Working with China organisations, it will seek to demonstrate how this knowledge may be applied in new and entirely innovative ways, extending the boundaries of knowledge.

In addition, EDUI will seek to show how such innovations may be applied in practice, not just in theory, via pilot and demonstration projects. It is important that such projects do not only have local benefits, but are translated into government policies and directives so they may result in momentous change. This is possible through the power of many small things, accompanied by policy changes to enable structural reform.

How is this ambitious goal possible, given that EDUI is a new and relatively small organisation, and the challenges are so huge? But as Obama said, 'Yes we can'!

There are many organisations working in the sustainable development arena. As I once heard, "the field is crowded". Rather than being just another organisation and adding to this over-crowding, overlap and duplication, EDUI can be aware of what others are doing and how new ideas may emerge, especially in relation to the China circular economy policy and law. It can adopt an over-arching role, making connections.

For example, EDUI could connect the European Commission 'Switch' programme to CEB and the circular economy. This programme recognises that 'a switch is needed from unsustainable to sustainable patterns of development', and SWITCH ASIA was born out of this need. The programme focuses on sustainable consumption and production (SCP) and directly contributes to sustainable growth and, importantly, the fight against poverty. With its particular focus on SMEs, SWITCH contributes to poverty alleviation by improving the living conditions of poor households

by reducing water pollution (particularly improving conditions of women who traditionally have to source drinking water), solid waste and air pollution. It also contributes to increased employment and incomes.

Thus, by working in a smart manner, EDUI may seek to achieve widespread change by partnering with other organisations and creating connections, leading to whole new ways of thinking and approaches. This is similar to what happens when all the parts of an electric circuit are connected…the current runs and the light of knowledge shines brightly! This is also known as gaining synergies via applications of systems theory, connecting up the elements of a system.

Similarly, at Prof Haifeng Huang's urging, the EDUI website (www.ecological-development.com) was switched on during 8 August 2008, an auspicious date, coinciding with the opening of the Beijing Olympics. I could feel the burst of energy and hope.

**5. Where should EDUI focus its attention? Some themes**

EDUI could thus focus its attention not just on ecological conservation, but on ecological development – achieving socio-economic development coupled with environmental improvement. It could facilitate and promote projects that have these ingredients, projects and practices that have multiple 'sustainability' benefits - economic, social and environmental, all in harmony.

It is important that EDUI should determine what are the important areas where a shift to circular economy is required, and hence where it should focus its attention and have the maximum impact.

Policy development related to the circular economy and environment is a primary theme, and Prof Haifeng Huang and his colleagues recently wrote a significant paper on China environmental innovation policy (Huang et al 2008). I believe the theory and concept of the circular economy is an area well worth investigation, in the context of other similar national policies eg Korea 'resource circulating society', Japan's 'Sound material cycle society' and Thailand's 'sufficiency economy'.

The built environment and infrastructure is an important area, as this established consumption patterns for decades to come and is the largest generator of emissions. The building sector alone is responsible for around 30-40% and, when combined with infrastructure, is well over 50%.

The manufacturing sector is another big contributor to emissions and consumption, thus EDUI will also target sustainable consumption and production, again linking with international initiatives eg Asia Pacific Round Table on Sustainable Consumption and Production (APRSCP), the European Sustainable Consumption Research Exchange (SCORE), and the European Commission funded SWITCH ASIA.

EDUI also aims to focus its attention on behaviour change, values such as care and humility, business ethics, and 'education for sustainability'. Recently in Australia I viewed a TV documentary on 'the cars that ate China'. This highlighted the growing obsession of China's youth with material possessions, following the very poor example set by their western counterparts. The image that most caught my attention was of a young Chinese man on his wedding day. He was more interested in his car than his bride! This highlights the magnitude of the challenge…how to change such behaviour and achieve shifts in mindsets and attitudes? China has a philosophy known as 'Xiaokang' society, meaning 'a society of modest means'. Similarly, the Chinese Government has a commitment to 'building a well-off society in an all round way'. It is also noteworthy that the people first concept will be stressed in China's future S & T development: 'the starting point of S & T undertakings is to meet people's increasing material and spiritual needs, in order to have everyone enjoy the benefits of S & T and new opportunities for development', as Prof Xu said (2006).

Thus, EDUI is beginning to structure a series of discussions on the following themes:

1. Circular economy and environmental policy
2. Sustainable built environment and logistics
3. Sustainable consumption and production
4. Innovation and business strategy
5. Market, product and servicizing
6. Care and humility
7. Venture capital
8. Today's China: Business ethics and cultural legacy

We aim to promote discussion and spread learning on these topics, accompanied by facilitating demonstration projects.

**6. New way of thinking: the service economy and systems**

To achieve major change and 'leapfrog' previous approaches, I believe we need to adopt a new way of thinking, building upon the notion of Robert Ayers that products may be seen as "service carriers" – an innovative concept that underpins sustainable product service systems. The notion of doing more with less may be applied not only to products, but also to buildings, infrastructure and communities. How can maximum benefit be obtained from resources, including land, materials, energy and water, so that they are used more efficiently? China's 'Circular Economy' already promotes keeping resources in closed loops so that they are taken back, reused and recycled. How can the use of resources also be minimized, whilst still delivering increased services? In this regard, concepts such as 'lean', strategic asset management and systems thinking are relevant. The latter enables a more holistic view of the connections between various components, whereby more may be achieved with less by integration, connectivity and synergies.

**7. More output, less input: Ger insulation, Mongolia**

I spoke of one simple example of this philosophy when in Beijing one year ago, and I would like to repeat this briefly because I feel it sums up, in a simple manner, the concept of doing more with less. Whilst on a UN mission to the city of UlaanBaatar, Mongolia, I discovered that serious air pollution in the city was caused mainly by smoke from the thousands of 'gers' (informal dwellings or tents), when the occupants burnt wood and poor quality coal to keep warm. The toxic fumes also adversely affected the health of the ger occupants. UNDP Mongolia (2006) devised a very simple yet innovative solution – insulation blankets to cover the tents in winter, so the occupants would need to burn less coal. Not only did this improve environmental conditions, but it also had a number of other benefits: the fabrication and deployment of the blankets created local employment; an increase in disposable family income due to less spending on coal, leading in turn to education benefits and the like; and it resulted in less waste due to less fuel being burnt (coal, wood). This innovative scheme well demonstrated the principle of 'doing more with less'. Sadly, it is yet to be widely implemented.

**8. Infrastructure service systems**

The UN has a project on 'Eco-efficient and sustainable infrastructure development in Asia and Latin-America', and I am currently a UN consultant to review and recommend conceptual frameworks and methodologies. An important concept is that infrastructure should be seen as a *system* to facilitate the delivery of *services*. This enables, for example, a road to be viewed within the context of a transport system, with an understanding of its connectivity to other elements and to other systems. The introduction of systems thinking opens up opportunities for innovation and reform, which is very necessary to achieve the paradigm shift required to meet Factor 4 and associated targets.

**9. Research on product service systems or 'servicizing'**

I would like to use a further example to explain the special role that EDUI may play, in promoting innovation. This relates mainly to products and 'servicizing' (EDUI Theme 5).

The circular economy law promotes *recycling*, but we also need to focus on *reducing* and *reusing* (ie the 3Rs). Product service system innovation, otherwise known as servicizing, involves providing products as part of a service (see Ayers 1999; van Halen et al 2005). The provider of the service retains ownership of the products, takes them back, and reuses and recycles them. As Walter Stahel foresaw many years ago, this was more resource efficient than energy intensive recycling alone, and enabled products to be kept in closed loops, the true 'resource circulating society' or circular economy (Stahel 1982).

The EU and USA have pioneered such approaches, and I have been involved with research at the University of South Australia. Firstly, we examined the environmental and financial implications of various procurements approaches (lease, lease-to-buy, and rental) for InterfaceFlor modular carpets from the perspective of probability of take-back. Rental approaches (akin to S-PSS) enabled dramatic improvements in terms of waste, emissions and also improved remuneration for the provider. This offered the potential for the 'win-win' scenario described earlier.

Encouraged by these early findings, my colleagues and I have pursued application of these approaches to computers with partners including Hewlett Packard, which has the slogan "HP + invent = everything is possible'. HP has some examples of service solutions that were successful from a business perspective eg increased return on investment. It is now keen to determine whether such approaches also have environmental benefits.

My colleagues in Australia, including Dr Ke Xing and Dr Wei Qian from University of SA, and Prof Suzanne Benn from Macquarie University, New South Wales, are keen to develop international linkage with our research project on sustainable product service systems (S-PSS) eg via China-Australia Research Fund.

**10. Wider applications: potential for socio-economic development**

My colleagues and I recognise that the social and economic aspects of the S in S-PSS (sustainable product service systems) require more attention as, hitherto, most international research and applications have focused on helping providers and manufacturers implement such approaches. We believe that S-PSS approaches have potentially much greater benefits than just in the business world. Using S-PSS for helping rural and disadvantaged communities is certainly worth investigation, which can contribute to social and economic sustainability.

Adopting the earlier mentioned concept of 'doing more with less' and achieving socio-economic development with less resource use, these approaches may be introduced to local communities. Thus, similar to the 'ger' example, they may offer multiple benefits, including employment generation, poverty alleviation, etc – contributing to many of the Millennium Development Goals.

**11. Gaining inspiration from solar lantern system, India**

I am impressed by the 'women as solar entrepreneurs' project of The Energy and Resources Institute (TERI, India). As described by Chowdhury (2006), women learn how to assemble, repair and maintain various solar energy products such as solar lanterns, and rent such products to community members. The project has a unique blend of women's empowerment, rural community development, environmental protection and local participation. It leads to employment generation, poverty alleviation, self- esteem, even educational benefits as the solar lanterns provide light for study. Grameen Shakti, Bangladesh, is another similar example of an evolving social business to meet the energy needs of rural people, coupled with micro-credit.

**12. Possible EDUI project: renewable energy systems,**

With EDUI, we envisage a wider project, which contributes to other EDUI themes such as sustainable consumption and production (3), innovation and business strategy (4), care and humility (6), and venture capital (7). This example also recognises that the China government has set the economic development of rural areas as its highest priority.

EDUI may act as a 'broker' and bring together various elements, connecting them as part of a total system, and realizing creative synergies – similar to the electric circuit described earlier. The project may use distributed infrastructure service systems and technologies, focused on renewable energy, for sustainable socio-economic generation of disadvantaged local communities in China. The proposed project may also link with the China Rural Energy Enterprises Development (CREED) Initiative, where renewable energy and energy efficient systems – supported by Green Village Credit Loans – are designed to help households generate income (see UNDP and the Nature Conservancy 2007). A further link is possible with research being undertaken by the Huazhong University of Science and Technology, Wuhan, China, concerning a system dynamics approach to eco-efficiency of rural communities in China. The project may also benefit from linkages to the International Solar Energy Society, the International Network on Gender and Sustainable Energy (ENERGIA), UN ESCAP and UN-Habitat energy for the poor initiatives, coupled with access to international expertise in S-PSS in developing nations eg the work of J C Diehl of Delft University of Technology. Diehl sought to optimise the entire product service system including end users, understanding their real needs related to lighting, heating and cooking, and creating added value (Diehl 2006). A further connection is possible with the work of the Centre for Appropriate technology (GrAT), Vienna University of Technology, related to 'zero carbon villages' and innovative solar collectors and tracking systems, all made from recycled materials. Thus, small scale, distributed, community-based renewable energy schemes, involving solar water heaters, solar water purifiers, solar lanterns, fuel efficient stoves, biogas digestors and micro-hydro may not only provide heating, lighting, cooking, clean drinking water and the like, but also education, employment and many other socio-economic benefits.

Thus, there are many examples of initiatives - on similar topics – developed by various organisation, often unconnected. I see a role for EDUI in joining these together, especially where these may promote the circular economy.

Such innovation through connecting up existing know-how and expertise, leading to an entirely new form of innovation, exemplifies the strategy described earlier. It has the potential to achieve system-wide improvement and 'momentous change', through 'the power of many small things' (Wescott, ICLEI, 2008).

**13. Some thoughts on 'white pollution'**

How can the previous thinking be applied to plastic wrappings and packaging such as styrofoam, and resultant 'white pollution'?

If we consider that packaging is the responsibility of the producer, known as 'extended product responsibility' or product stewardship, then the producer needs to have a system in place to take this back. Moreover, if durable goods were provided as part of a service, then there would be less need for packaging and the use of plastics would be reduced.

If customers, for example, become interested in the service provided by (say) a washing machine or a computer, then the packaging assumes less importance. They will simply be provided the product in their home or business and, after this reaches its 'use by date', it will be taken back, reused or reconditioned. In theory, PVC can be 100 per cent recycled, and can be kept in closed loops indefinitely – this is the theory behind InterfaceFlor's modular carpets, and its thermoplastic

recycling plant. The problem is having logistics in place to take back the carpet – as earlier-mentioned research indicated, this is far more likely with rental and service contracts.

Customers will need to understand that extravagant and voluminous packaging is not resource efficient. Shareholders will also need to demand more resource efficient solutions, and the performance of companies will need to be reported, as part of their corporate social responsibility.

Consistent with the notion of community service systems described earlier, we need to gain increased value and benefits from plastic bags and the like. For example, plastic bag collection and garbage recycling in Thailand (Wongpanit Recycling Co Ltd) has created a whole new industry, the 'waste bank', and taken a number of beggars out of poverty. I have also heard of plastics being collected and made into expensive products such as handbags, again creating a new industry and employment. Countries such as Thailand and Philippines are acknowledged world leaders in recycling programmes that generate income for the poor, and this has been a focus of the Kitakyushu Initiative (KI) for a Clean Environment, which seeks to share experiences between cities and countries of the Asia-Pacific (I was personally exposed to some of the KI projects when evaluating the initiative for UNESCAP in 2006-2007). It is interesting to note that the Minister for Environment and Conservation in my own state, South Australia, has recently introduced legislation to ban plastic bags entirely! (Zero Waste SA, 2008).

Thus, EDUI could bring international know-how and perspectives to bear on this problem, leading to unique, indigenous and innovative solutions being developed in China.

**14. Measuring resource productivity**

An important aspect of achieving a Factor 4 or 5 shift in resource efficiency or productivity is being able to measure and compare various solutions, by techniques such as 'Material Input Per unit of Service' or MIPS (Schmidt-Bleek 1992). Solutions that deliver more services (including social and economic benefits) with less resource consumption and environmental impact will be preferred.

This should be seen in wider context of establishing and achieving targets for a Factor 5 or more shift (see von Weizsacker et al 1997), and targets for energy savings and emissions reductions. The Wuppertal Institute (2007) has developed a useful indicator system to identify Factor 4 best practices, involving quantitative indicators such as energy and raw material consumption, and qualitative such as social effects (employment generation, quality of living, health etc).

**15. Funding of projects**

Whilst there are opportunities for funding projects via 'Clean Tech' venture capital funds and the Clean Development Mechanism (CDM), linking green with socio-economic benefits opens up greater opportunities for investment support eg the World Bank Community Development Carbon Fund (CDCF). The CDCF fosters projects in the poorer areas of the developing world that combine community development attributes with emissions reductions to create 'development plus carbon' credits – aimed at significantly improving the lives of the poor and their local environment. One example of a CDCF project is the installation of solar home systems in Bangladesh, involving Grameen.

**16. Closing comments: EDUI support for Circular Economy Branch (CEB)**

EDUI is thus very keen to work closely together with CIARPA-CEB, as an extension of its activities and in a supportive role. We will be pleased to develop a co-operative work programme, and to co-schedule events wherever possible. Thankyou for the opportunity to speak at this important event, it is a great honour.

**References**


Ayres, R U (1999), *Products as Service Carriers: Should we Kill the Messenger – or Send it Back?* Zero Emissions Forum, United Nations University, Tokyo.
http://www.unu.edu/zef/publications_e/ZEF_EN_1999_01_D.pdf

CSIRO (2008), 'Growing the green economy: skills and labour challenges in reducing our greenhouse emissions and national environmental footprint', Dusseldorf Skills Forum, Australia
http://www.dsf.org.au/papers/204.htm

Diehl, J C (2006), 'Renewable energy in emerging countries form an end-user and business perspective', UNIDO, MOT, Berkeley.
http://bridge.berkeley.edu/2006_Pages/PresentationArchives/2006/Panel%206/Diehl.pdf

Huang, Haifeng, Zhou, Guomei, and Liu, Min (2008), 'Chinese environmental innovation policy: retrospect and prospect' (in press).

Kitakyushu Initiative for a Clean Environment http://kitakyushu.iges.or.jp/

Ness, D (2008), 'Doing more with less: more services with less material and energy use', *Seoul Initiative Network on Green Growth, Newsletter 4*, March
http://singg.org/main/main.asp

Renner, Michael (2008), 'Green jobs: working for people and the environment', *Worldwatch Repor*t, Worldwatch Institute. www.worldwatch.org/node/5925

Schmidt-Bleek F (1992), 'MIPS – A Universal Ecological Measure', *Fresenius Environmental Bulletin 2*, pp 407-12.

Stahel W (1982), *The Product-life Factor*, Product-Life Institute, Geneva.

Sustainable Consumption Research Exchange (SCORE)
http://www.score-network.org/score/score_module/index.php

SWITCH ASIA
http://ec.europa.eu/europeaid/where/asia/regional-cooperation/environment/switch_en.htm

UNDP Mongolia (2006), *Commercialization of Super-Insulated Buildings in Mongolia*, MON/99/G35, 1 May.

UNEP and The Nature Conservancy (2007), *Green Village Credit, China Rural Energy Enterprises Development (CREED) Initiative*, Yunnan www.c-reed.org

UNESCAP (2008), Sustainable Infrastructure Development
http://www.unescap.org/esd/environment/infra/index.asp.

Van Halen C, Vezzoli C and Wimmer R (2005), *Methodology for Product Service System Innovation: How to Develop Clean, Clever and Competitive Strategies in Companies*, Koninklijke Van Gorcum, Netherlands.

Von Weizsacker E, Lovins A and Lovins H (1998), *Factor 4: Doubling Wealth, Halving Resource Use – A Report to the Club of Rome*, Earthscan Publications.

Wattanachaiyingchatroen, D (2007), 'Wongpanit Garbage Recycling Separation Plant', *UN Green Growth Policy Dialogue Greening of Business and Environment as a Business Opportunity*, Bangkok, June.
http://www.greengrowth.org/download/green-business-pub/The_Policy_Dialogue/Programme/Day1/Topic3/Mr_Det_Wattanachaiyingchatroen.pdf

Wescott, Wayne (2008), Special forum 13, World Sustainable Building Conference SB08, Melbourne, September. Wayne Wescott is the Chief Executive Officer of ICLEI Oceania (Local Governments for Sustainability). http://www.iclei.org/index.php?id=6112

World Bank Community Development Carbon Fund
http://wbcarbonfinance.org/Router.cfm?Page=CDCF&ItemID=9709&FID=9709

Wuppertal Institute (2007), 'Factor Four – Indicator System', Science Centre North Rhine-Westphalia, Wuppertal Institute for Climate, Energy and Environment
http://www.wupperinst.org/FactorFour/index.html

Xu, Guanhua (2006), 'China's science and technology towards the new era', Public Lecture, Canberra, 16 February. http://www.science.org.au/events/16february06.htm

Zero Waste SA (2008), Plastic bag reduction programme
http://www.zerowaste.sa.gov.au/prog_bags.php