

GeoWatch





Ministry of Environment & Renewable Energy
Ministry of Industry & Commerce



International Conference on WASTE MANAGEMENT



INTERNATIONAL CONFERENCE ON WASTE MANAGEMENT: TOWARDS WASTE FREE SRI LANKA

22nd March 2013,
Hotel Cinnamon Lakeside, Colombo.

AGENDA

INAUGURATION SESSION

- 8.30 – 8.55 Registration
- 8.55 – 9.00 Safety Briefing
- 9.00 – 9.10 Welcome speech and objectives of the International Waste Conference by Mr. B.M.U.D. Basnayake, Secretary to the Ministry of Environment and Renewable Energy
- 9.10 – 9.15 Geocycle's vision towards waste free Sri Lanka by Mr. Philippe Richart, CEO, Holcim (Lanka) Ltd
- 9.15 – 9.30 Key Note address "Role of media to change perception/attitude of general public towards waste free Sri Lanka" by Mr. Charitha Herath, Secretary to the Ministry of Mass Media and Information
- 9.30 – 9.40 Guest of honour – Hon. Rishard Bathurdeen, Minister for Industry and Commerce
- 9.40 – 9.50 Chief Guest – Hon. Susil Premjayanth, Minister for Environment and Renewable Energy
- 9.50 – 10.15 Tea

FIRST TECHNICAL SESSION

Panel Chair – Prof. B A F Basnayake, Senior Professor, University of Peradeniya

- 10.15 – 10.45 An overview of industrial waste management in Sri Lanka by Prof. Ajith de Alwis, Project Director, Office of Science Technology and Innovation, Coordination Secretariat of STI. Senior professor, Chemical & Processing Engineering, University of Moratuwa
- 10.45 – 11.15 Global overview of industrial hazardous waste management by Dr. Carlo Lupi, Consultant, United Nations Industrial Development Organization
- 11.15 – 11.35 Financial facilities available for industrial waste management by Ms. Rita O'Sullivan, Country Director, Asian Development Bank
- 11.35 – 12.00 How global strategies could localize in industrial waste management with success stories by Dr. Stefanous Fatiou, Regional Coordinator for Resource Efficiency, Division of Technology, Industry and Economics for the Asia Pacific Region, United Nations Environment Programme
- 12.00 – 12.45 Plenary Discussion
- 12.45 – 13.45 Lunch

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SECOND TECHNICAL SESSION

Panel Chair – Dr. Mahesh Jayaweera, Senior Lecturer, University of Moratuwa

- 13.45 – 14.00 Extended Producer Responsibility in minimizing wastes in consumer perspective by Dr. Ajantha Perera, Consultant, Consumer Affairs Authority: Founder, National Solid Waste Recycling Programme
- 14.00 – 14:30 Hazardous Waste Management in Korea; History, Present and Perspectives by Prof. Dong-Hoon Lee, Dept. of Environmental Engineering, Graduate School of Energy and Environmental System Engineering. University of Seoul.
- 14.30– 14.50 Paradigm shift in industrial waste management: case study from Geocycle, Sri Lanka by Mr. Randeewa Malalasooriya, Business Development Manager – Geocycle, Holcim (Lanka) Ltd.
- 14.50 – 15.10 Maliban’s Sustainable Waste Management Approaches -Case study, by Ms. Warna Fernando, General Manager – Quality Assurance & Research Development, Maliban Biscuits Manufactories Ltd.
- 15.10 – 15.40 Holcim global experience in handling and managing MSW by Mr. IB Larsen, Regional MSW System Development Manager at Holcim Asia Network
- 15.40 – 16.00 Supportive role of CEA in waste management by Mr. K. H. Muthukudarachchi, Deputy Director General, Central Environment Authority
- 16.00 – 16.45 Pen Ultimate Plenary Discussion
- 16.45 – 17.00 Tea

FINAL PLENARY DISCUSSION

Headed by Mr. B.M.D.U. Basnayake, Secretary to the Ministry of Environment and Renewable Energy

- 17.00- 17.45 Panel discussion on “Way Forward”
Panel members -
Mr. Asitha Senevirathne, Add. Secretary, Min of Ind
Mr. Muthukudarachchi, Deputy Director General, CEA
Dr. Ananda Mallawatantri, Asst. Country Director, UNDP
Mr. Sena Peiris, Director, NCPC
Mr. Harin Malwatte, Chamber of Commerce, Secretary General
Dr. Ajantha Perera, Consultant, Consumer Affairs Authority
- 17.45 – 18.00 Closing remarks by Mr. B.M.U.D. Basnayake, Secretary to the Ministry of Environment and Renewable Energy
- 18.00 onwards Cocktails

Panel Chair

**Professor B A F Basnayake**

Senior Professor Energy and Waste Management, University of Peradeniya , Former Renewable Energy Sources (CRES), Postgraduate Institute of Agriculture (PGIA), UoP,

Doctor Engineer

DEA in Applied Chemical Kinetics, B.Sc. in Agricultural Engineering

Resource persons

**Professor Ajith de Alwis**

Project Director, Office of Science Technology & Innovation, Coordination Secretariat Professor of Chemical & Process Engineering at University of Moratuwa

BSc ENG (Moratuwa) MBA (PIM-SriJ) PhD (Cambridge) MAChE FNASSL

**Dr. Carlo Lupi**

Consultant, UNIDO, Partner of Wasteandchemicals S.r.l.

Graduated in biology with an experimental dissertation concerning the hazard and assessment of benzotrifluorides in water

**Ms. Rita O'Sullivan**

Country Director, Sri Lanka Resident Mission (SLRM)

Asian Development Bank (ADB)

Barrister & Solicitor, High Court of Australia, holds degrees in Arts, Economics, and L Masters of Laws from the University of Queensland, Australia,

**Mr. Stefanos Fotiou**

Senior Regional Coordinator on "Resource Efficiency" for Asia and the Pacific Region

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**Dr (Mrs) Ajantha Perera**

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MSc. Environmental Science, University of Munich, Germany

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Dr. Mahesh Jayaweera

Senior Lecturer in Environmental Engineering, University of Moratuwa

BSc (Engineering), PhD from Sitama University of Japan,



Dr. Dong-Hoon Lee

Professor, Department of Environmental Engineering, University of Seoul, KOREA

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Mr. Ib Larsen

Regional MSW System Development Manager at Holcim Asia Network. Advisor to the Sarawak State Government, The Malaysian Government and the Jakarta Regional Government, The work involved most technical, institutional and legal aspects of MSW management.

MSc (Environmental planning), University of Copenhagen, Denmark



Mr. K.H. Muthukudarachchi

Deputy Director General
Central Environmental Authority

BSc, University of Sri Jayawardhanapura, MSc (Forestry and Environment) Specific training on industrial pollution control, special reference to water and air

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Phillipe Richart
CEO - Holcim (Lanka) Ltd.

Passion towards waste free Sri Lanka

I am very pleased to introduce the second issue of GeoWatch, published amidst the 10th year celebrations of Geocycle, the waste management arm of Holcim (Lanka) Limited.

Being a responsible corporate citizen, Holcim (Lanka) Ltd always try to have a positive impact on the wellbeing of the economy, ecology and communities of the country. Having well ingrained the system of sustainable development, we set many examples for industrial ecology, which is where Geocycle plays an important role.

It is delightful to note that an entity which started off as a small operation 10 years back, has today developed into a professional service, which many other industries rely on in order to reduce their corporate footprint. Over the past decade of business, Geocycle has slowly but steadily transformed into its line of concrete actions, which includes removing waste totally, permanently and fast, without leaving any environmental liability for generations to come.

As understood very clearly by the Government, a mere cleanup is not enough! As a nation, we have to start moving towards a target of a waste free Sri Lanka. It is in this endeavor that Geocycle joins hands as a strong partner together with the Ministry of Environment, Central Environmental Authority and other regulatory bodies in order to manage waste in a proper manner, without leaving any environmental impacts on the future generation. Also, it takes many efforts in educating stakeholders across the industry to take care of what they throw out to waste bins – to educate them about reusing, recycling, repairing and reinventing those resources

for both the sake reducing wastes as well as to preserve them for future generations.

It is with the intention of creating this awareness, that Geocycle publishes Geo Watch. This is the only platform where all opinion formers, leaders and other such stakeholders within the waste management industry can share their knowledge and experience with their peers. Geo Watch entails not only environmental aspects, but also economic and social aspects. Indeed, from an ecological perspective, we can go beyond the historical elements of air, water and earth pollution, to the more modern approaches of resource efficiency, ecological footprint and CO₂ emissions impact.

Therefore, in the framework of “Towards a Waste Free Sri Lanka”, we present Geo Watch, at this International Conference on Waste Management which will aim at presenting best Zero Waste practices that have allowed for waste reduction and high recycling rates and minimizing residual waste.

Whilst wishing Geocycle a prosperous 10th anniversary, I also wish to thank the team in their efforts to illustrate practical examples of companies, municipalities and communities that are moving towards “Zero Waste” hard work in raising awareness about the latest developments in waste policies. Moreover, my heartiest thanks to the expertise of organizations, enterprises and NGOs from the sector, which encompass many local and regional authorities as well, who have come forward to make this conference and with it, the 10th year anniversary of Geocycle a success.



Pascal Paijens
Vice President
Manufacturing
Holcim (Lanka) Limited



Asela Iddawela
General Manager - Geocycle
Head of External Affairs
Holcim (Lanka) Limited

Gaining confidence to go beyond compliance

Our ecosystem is under unprecedented pressure, threatening tomorrow's prospects of sustainable development. Improper waste disposal is surely a big contributor towards this situation. Therefore immediate steps must be taken to ensure minimal impact to the environment through sound waste management approaches, without further delay.

In this context, the sustainable and professional solutions offered by Geocycle play a very important role. Geocycle has extended its professional solutions to more than 300 industries, and has contributed tremendously to the improvement of green initiatives in those entities, by implementing the 5R concept of Reduce - Reuse - Recycle - Reinvent and Replace. It is noteworthy that the amount of waste volumes generated within most of the Geocycle customers has gradually reduced due to implementation of 5R. Further Geocycle makes tireless efforts in educating workforces on sustainable practices for waste disposal - starting from segregation at the point of generation.

Yet we feel that there is a lacuna in awareness among the industrial sector about prevailing sustainable waste management solutions and individual responsibility in minimizing wastes, hence we as

an entity have taken many initiatives to create awareness among the industrial community on environmentally responsible waste management.

Geo Watch is one such attempt, as it provides a platform to share best experiences, success stories, issues and concerns with regard to wastes, even failures and lessons learned. Geo Watch will be a guidebook for all for managing their waste in a professional and environmentally responsible manner. Another initiative taken by Geocycle amidst our 10th year celebrations is the International Conference on Waste Management, conducted under the theme of "towards waste free Sri Lanka", in order to create awareness among all stakeholders across the industry, which we believe is crucial in today's fast pace development.

Within this 10 year journey, Geocycle has achieved many a confidence and trust as a reliable partner to solve waste problems – and that is the most important achievement we have gained during the past decade of business. What's more, the Gold award received at the National Waste Conference is yet another milestone in our drive, which has encouraged us to go beyond compliance to achieve more in greening and cleaning Sri Lanka - "because tomorrow matters!"



Mr. B.M.D.U. Basnayake
Secretary to the Ministry of Environment and Renewable Energy

The importance of industrial waste management

The importance of industrial waste management is a co-pillar of sustainable environmental management aspect aligning with global socioeconomic equilibrium. With the ever increasing human consumption patterns, generation of waste also increased. Generation of both easily biodegradable and long term non degrading waste streams are generated with current production and consumption practices.

Some of the chemical constituents embedded in the waste streams take a long time to degrade and disintegrate / dissolve into harmless materials. These components could not be disposed using available ordinary techniques. Such pollutants need special methodologies and processes for judicious disposal. Considering these known facts, proper industrial waste management is not only highlighted as a global requirement but also as a key national priority. However, utilizing of globally accepted best practices will only provide proper solutions.

Ministry of Environment and Renewable Energy leads on setting standards and strategies on proper industrial waste management in Sri Lanka. Post evaluations (checking process) is well established through the implementing statutory mechanisms; however a reduced and well managed hazardous industrial waste generation is beneficial not only on conserving natural resources but more tangibly on socio, economical and health advances. By implementing Cleaner Production and Green Manufacturing Practices, industries can drive towards this direction.

Proper industrial waste management is a national priority since it is a definite future investment. However, entities having sound hazardous waste management facilities are very minimal in Sri Lanka and Geocycle, a business unit of Holcim Lanka plays a commendable national role.

The demand for environmentally friendly hazardous and industrial waste management is ever increasing in Sri Lanka. Proper and acceptable sound waste management solutions create high potential market opportunities and it is a guaranteed investment in the current context.

Establishing internationally accepted proven sustainable industrial waste management projects in Sri Lanka is an important step addressing this issue. Ministry of Environment and Renewable Energy always ready to welcome and facilitates these projects, considering them as a national priority.



Dr.Suren Batagoda
Deputy Secretary to Treasury
Ministry of Finance and Planning

Sri Lanka towards waste free society

In the absence of strong local government system, managing solid waste has become one of the major challenges of social and economic development in Sri Lanka. Domestic wastes, commercial wastes, industrial wastes, street sweeping and beach cleansing waste, garden waste and waste collected from drains and water courses and urban areas are the major sources of solid waste that pollute country's landscape. Total waste generation in Sri Lanka is about 6,400 tons per day of which only around 2,800 tons per day are collected by relevant local authorities (Ministry of Environment). The balance 3600 tons solid waste per day are dumped all over the cities including in road sides, water bodies and low lands causing serious health and environment treats. Spreading various diseases such as dengue, leptospirosis, bacillary dysentery, filariasis and malaria are major health impacts. The open dumps of solid waste are ideal places for breeding disease vectors such as mosquitoes, flies etc. This also reduces aesthetic value and scenic beauty of the environment which has negative impact on tourism. Many local authorities do not have proper collection and disposal system of their solid waste mainly due to inadequate funding and non-availability of land. Some local authorities are not ready to take ownership of the issue.

The government recognizes the importance of investing in solid waste management and spends around Rs. 3000mn annually for increasing solid waste management capacity in the country under the Pilisar project.

Policy Direction on Solid Waste Management

As Sri Lanka moves to upper middle income country, the solid waste management strategy has shifted towards a progressive direction through maximum participation of private sector using public-private-partnership model. The MahindaChintana Policy Framework of the country emphasizes the conservation of the environment by introducing appropriate policies including proper solid waste management practices. The government focuses on effective solid waste management and expects to strengthen local authorities and other relevant agencies in order to monitor regulations, impose punishments and to follow the preventive procedure or abuser pay principle. In addition modern technologies and private sector investments are encouraged for more

Major Issues

Both government and local authorities do not give highest priority for waste management

- Inadequate technical capacity of local authorities
- Weak institutional structure and inadequate funding
- Local authorities do not take full ownership
- Weak private sector participation
- Public-Private-partnership (PPP) is recognized but not practice.
- Attitudinal shift of people on waste fee society

commercially viable waste management projects such as biogas and organic fertilizer production. Recycling of plastic and polythene will be expected to increase by 100 percent. In addition all industries are encouraged to run as eco-friendly industries through effective waste management systems.

The present National Strategy for Solid Waste Management (2000) in Sri Lanka recognizes the importance of waste avoidance, reduction, reuse and recycling and final

disposal in an environmentally sound manner. In 2007, the government has introduced National Policy on Solid Waste which recognizes “polluter pay principal”. In addition, several guidelines (Technical guideline on Solid Waste Management in Sri Lanka -2005 published by Central Environmental Authority, Sri Lanka Standard 1246: 2003 (UDC 628.477.4, Specifications for Compost from Municipal Solid Waste Management and Agricultural Waste, Sri Lanka Standard Institution) were introduced by the government to improve solid waste management.

Vision Towards

Solid waste free cleaner cities, cleaner rivers and roads by converting solid waste to valuable economic resources and attracting private investment in solid waste management through Public – Private – partnership (PPP) projects.

Table 01; Sector Strategies and Targets of Government on Solid Waste Manag

Issue	Strategy	Indicator	Situation(2010)	Medium Term Target (end of 2015)	20
Increasing the Trend of Solid Waste Generation	Collecting , recycling, composting and sanitary land filling	Total waste collection per day	2900Mt	6000Mt	80
Increasing the trends of Plastic and Polythene Waste Generation	Collecting & recycling, awareness creation and implementation of tax and tariff to discourage import of virgin plastics	Total Plastic waste collection per day Value of imports of plastic and polythene per annum	7200Mt Rs. 25 bn	9000Mt Rs.20 bn	15 Rs.

Conclusions

During last few years, the collection solid waste improving in most cities. Most cities are now clean. However, still many local authorities do not implement scientific solid waste management strategy which includes reduce-reuse-recycle principle. The economic value of solid waste has not been fully realized. Even though, there is a great potential to attract private investment in the sector, still private sector is not active in implementing waste sector projects such as waste to energy projects, biogas projects and compost fertilizer production projects. Therefore, public –private –partnership (PPP) model must be introduced as a matter of priority to for the solid waste management

sector. Strengthening the local authorities by introducing appropriate institutional, financial and legal mechanisms should also be done for the sustainability of solid waste management.

Polythene product, bags and sheets less than 20 Microns in thickness are banned in Sri Lanka.

Assisted by
RajithaKisagothamI Jagoda - Assistant Director
Department of National Planning
Ministry of Finance and Planning



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කසලින් තොර ශ්‍රී ලංකාවක් සඳහා මධ්‍යම පරිසර අධිකාරියේ කාර්යභාරය සහ අපද්‍රව්‍ය කළමනාකරණය

ඉන්දියන් සාගරයේ මුතුඇටය යන ගෞරව නාමයෙන් ඇත අතිතයේ සිට හඳුන්වනු ලබන මේ මනරම් දිවයින පුරාතන ඉතිහාසයේ සිටම මනරම් සුන්දර රටකි. දේශගුණය හා භූමියේ නිර්මාණය සහ සුන්දර බැවින් යුත් වැවෙන ගහ කොළ, ජීවත්වන සතා සිව්පාවුන්, නදී, දිය ඇලි, වන උයන්, වැව් පොකුණු ආදියෙන් සමලංකාත මේ දවසින් පරිසරය දුටුවන් මන නුවන් පැහැර ගන්නා බව තොරහසකි. මෙවන් පරිසරයක් සදාකල්මී රැක දීම රටවැසි අප හැම දෙනාගේම යුතුකමයි. අප රටේ පවත්නා ආණ්ඩු ක්‍රම ව්‍යවස්ථාව අනුවද එය අවධාරණය කර තිබේ.

ශ්‍රී ලංකා ප්‍රජාතාන්ත්‍රික සමාජවාදී ජනරජයේ ආණ්ඩුක්‍රම ව්‍යවස්ථාවේ 27 (14) වන වගන්තියට අනුව ජනතාවගේ යහපත තකා රජය විසින් පරිසරය ආරක්‍ෂා කොට වැඩි දියුණු කළ යුත්තේය. එහි (28) (ඊ) වගන්තිය අනුව ස්වභාව ධර්මය සහ ස්වභාවික සම්පත් රැක ගැනීම ද ශ්‍රී ලංකාවාසි සැම තැනැත්තෙකුගේම යුතුකම වේ. එමෙන්ම වත්මන් රජයේ පරිසර සංවර්ධන ක්‍රියාවලිය පදනම් වී ඇත්තේ "ගහකොළ සතා, සිපාචාද සුරකින හරිත ශ්‍රී ලංකාවක්" යන තේමාව රැගත් මඟින්ද වින්තන ප්‍රතිපත්තිය මතය.

නාගරික සහ අපද්‍රව්‍ය අවිධිමත්ව පරිසරයට එක් රැස් වීම ශ්‍රී ලංකාව අද මුහුණ දී ඇති ප්‍රධාන පාරිසරික ගැටළුවකි. එය විශේෂයෙන් ම නාගරික ප්‍රදේශ වල තව දුරටත් උසු තත්වයකට පත්ව ඇත. මෙයට හේතුව වී ඇත්තේ සහ අපද්‍රව්‍ය බැහැරීමට විධිමත් කළමනාකරණ ක්‍රමයන් ක්‍රියාත්මක නොවීමයි. සමාජය තුළ සහ අපද්‍රව්‍ය ජනනය වීම ඉහල යාමට සිඝ්‍ර ජනගහන වර්ධනය, නාභ්‍යණික දියුණුව, මිනිස් ජීවන රටාවේ වෙනස්වීම් හේතු කාරක වී ඇත.

සහ අපද්‍රව්‍ය උපද්‍රවකාරී නොවන සහ උපද්‍රවකාරී ලෙස සරළව වර්ගීකරණය කළ හැක. නිවාස තුළ ජනනය වන්නේ ප්‍රධාන වශයෙන් උපද්‍රවකාරී නොවන සහ අපද්‍රව්‍ය වේ. මෙම දිවයින තුළ ජනනය වන සහ අපද්‍රව්‍ය බොහෝ විට යම් ප්‍රමාණයකට

අන්තරාදායක අපද්‍රව්‍ය සමග මිශ්‍ර වී තිබී හැක. නාගරික සහ අපද්‍රව්‍ය කළමනාකරණය කිරීමේ මූලික වගකීම පැවරී ඇත්තේ අදාළ පළාත් පාලන ආයතන වෙතය. එනම් මහ නගර සභා, නගර සභා සහ ප්‍රාදේශීය සභා වලටය. එම ආයතනවලට බලය පැවරී ඇත්තේ 1947 අංක 16 දරන මහ නගර සභා ආඥා පනත, 1939 අංක 61 දරන නගර සභා ආඥා පනත සහ 1987 අංක 15 දරන ප්‍රාදේශීය සභා පනත යන අණ පනත් වලිනි. එම අණ පනත් වලට අනුව නාගරික සහ අපද්‍රව්‍ය එම පළාත් ආයතන සතු සම්පතක් ලෙස අර්ථ දැක්වා ඇත.

සහ අපද්‍රව්‍ය කළමනාකරණය රටේ ප්‍රමුඛ අවශ්‍යතාවයක් බවට පත් ව ඇත. එ සඳහා සහ අපද්‍රව්‍ය කළමනාකරණය පිළිබඳ ජාතික ප්‍රතිපත්තියක් සකස් කර ඇත. එම ජාතික ප්‍රතිපත්තියට අනුව සියළුම අපද්‍රව්‍ය උත්පාදකයින්, අපද්‍රව්‍ය කළමනාකරුවන්, සහ සේවා සපයන්නන්ගේ පාරිසරික වගකීම සහ සමාජ වගකීම තහවුරු කිරීම තුළින් සියළුම පාර්ශ්වයන් පරිසර හිතකාමී ලෙස සහ අපද්‍රව්‍ය කළමනාකරණයේ නිරත වීම සිදු කරයි. එමෙන්ම මඟින්ද වින්තන ඉදිරි දැක්මේ සඳහන් වී ඇති ආකාරයට තිරසාර සංවර්ධනය සඳහා හිඳිල පිරිනැම රටක් හා පරිසර හිතකාමී පරිසරයක් ගොඩ නැගීම පිණිස ජාතික පරිසර පනතේ විධානයන් ක්‍රියාවට නැංවීමේ කාර්යය මධ්‍යම පරිසර අධිකාරිය වෙත පැවරී ඇත. එනම් උපද්‍රවකාරී අපද්‍රව්‍ය කළමනාකරණය යටතේ විද්‍යුත් අපද්‍රව්‍ය, සායනික අපද්‍රව්‍ය, කාර්මික අපද්‍රව්‍ය හා අතිකුත් ලැයිස්තු ගත උපද්‍රවකාරී අපද්‍රව්‍ය කළමනාකරණය මධ්‍යම පරිසර අධිකාරිය විසින් සිදු කරයි. මෙහිදී අන්තර්ජාතික සම්මුතීන් වල ප්‍රතිපාදනයන් ක්‍රියාවට නංවන ආයතනයක් ලෙසද මධ්‍යම පරිසර අධිකාරිය ක්‍රියා කරයි. බාසෙල් සම්මුතියේ අරමුණ වන්නේ විෂ සහිත වස අඩංගු, පිරිසිදු හැකි, බාදනය වන සුළු, ගිනි ගන්නා, සායනික අපද්‍රව්‍ය සහ ජෛවීය විෂ වැනි ගුණාංගත් සහිත උපද්‍රවකාරී අපද්‍රව්‍ය රටකින් රටකට ප්‍රවාහනය කිරීම පාලනය කරමින් එම උපද්‍රවකාරී අපද්‍රව්‍ය මානව සෞඛ්‍යට සහ පරිසරයට සිදුවන බලපෑම් අවම කිරීම සිදු කිරීමයි.

තවද, රොටර්ඩැම් සම්මුතිය යටතේ නිශ්චිත උපද්‍රවකාරී රසායනික ව්‍යුහගතවන වෙළඳාමේ දී ඇති විය හැකි හානියෙන් මානව සෞඛ්‍ය හා පරිසරය ආරක්‍ෂා කර ගැනීම සඳහා එ එ පාර්ශවකරුවන් අතර වගකීම බෙදා දීම සිදු කරයි. එලෙසම ස්ටොක්හෝම් සම්මුතිය මගින් දිගුකල් පරිසරයේ පවතින හානිය නොවන කාර්මික දූෂකකාරක මානව සෞඛ්‍ය හා පරිසරය එකී රසායනික ද්‍රව්‍ය වලින් සිදු වන හානියෙන් ආරක්‍ෂා කර ගැනීම සිදු කරයි.

මෙම සම්මුතීන් හා 1980 අංක 47 දරණ ජාතික පාරිසරික පනතේ විධි විධානයන් ක්‍රියාවට නැංවීම සඳහා මධ්‍යම පරිසර අධිකාරිය විසින් පරිසර අනුමැතීන් ලබා දීම, පරිසර ආරක්‍ෂණ බලපත්‍ර ලබා දීම, ලැයිස්තුගත (උපද්‍රවකාරී) අපද්‍රව්‍ය කළමනාකරණයට අදාළ බලපත්‍ර ලබා දීම, ව්‍යාපෘතින් සඳහා පරිසර බලපෑම් ඇගයීම් ක්‍රියාවලිය ආදිය ප්‍රමුඛ වේ. මෙහිදී අපද්‍රව්‍ය කළමනාකරණයට අදාළව දිවයිනේ ප්‍රමුඛ පෙළේ ව්‍යාපාරික ආයතන සමග විද්‍යුත් අපද්‍රව්‍ය කළමනාකරණ ජාතික වැඩසටහන, විවිධ වූ කමිටු හා ඇගයීම් වලදී අවශ්‍ය තාක්‍ෂණික ඇගයීම් හා දායකත්වය ලබා දීම, අධිකරණ කටයුතු සඳහා අවශ්‍ය තාක්‍ෂණික වර්තා ලබා දීම, පසු භාවිත ජලාස්ථික අපද්‍රව්‍ය කළමනාකරණය අදාළ මාර්ගෝපදේශ ලබා දීම සිදු කරයි.

මීට අමතරව මධ්‍යම පරිසර අධිකාරිය විසින් නිල්ල පිරිණු රටක් නැමැති සංකල්පය මත පදනම් වූ මහින්ද වින්තනයේ අභිප්‍රායන් සාක්ෂාත් කර ගැනීම සඳහා කසල කළමනාකරණය සඳහා පළාත් පාලන ආයතන වෙත මූල්‍යමය හා ද්‍රව්‍යමය ආධාර ලබා දීම සහ තාක්‍ෂණික උපදෙස් ලබා දීම පෙරදැරි කරගෙන පිළිසරු නමැති ව්‍යාපෘතිය ක්‍රියාත්මක කරනු ලබයි. පරිසරයට මුදා හරිනු ලබන පොලිතින් හා ජලාස්ථික අපද්‍රව්‍ය හේතුවෙන් පරිසරයට වන බලපෑම අවම කර ගැනීම සඳහා මෙම අධිකාරිය විසින් එවැනි පසු භාවිත ජලාස්ථික කළමනාකරණය කිරීම හා සම්බන්ධ විවිධ වැඩ සටහන් රැසක් පසු භාවිත ජලාස්ථික ව්‍යාපෘතිය මගින් දිවයින පුරා ක්‍රියාත්මක කර ගෙන යනු ලබයි.

මීට අමතරව දිවයිනම ආවරණය වන පරිදි පරිසර හිතකාමී ලෙස පවත්වාගෙන යනු ලබන කර්මාන්ත, රාජ්‍ය හා පුද්ගලික ආයතන සහ පාසැල් දිරි ගැන්වීමේ අරමුණෙන් වසරක් පාසා "හරිත සම්මාන උළෙල" නමින් සම්මාන උළෙලක් අතිගරු ජනාධිපතිතුමාගේ ප්‍රධානත්වයෙන් ඉතාමත් උත්කර්ෂවත් අන්දමින් පවත්වනු ලබයි. එමෙන්ම පාසල් ශිෂ්‍ය ප්‍රජාව පරිසර සංවර්ධනයේ වැදගත් ක්‍රියාකාරී කොටසක් ලෙස දැනුවත්, හුරුවෙන් යුතුව සූදානම් කිරීමට ක්‍රියාත්මක වන පරිසර නියමු කණ්ඩායම් වැඩ පිළිවෙල දශක තුනකට ආසන්න කාලයක් තිස්සේ සාර්ථකව ක්‍රියාත්මක කරනු ලබයි.

1988 අංක 56 හා 2000 අංක 53 න් සංශෝධිත 1980 අංක 47 දරණ ජාතික පාරිසරික පනතේ ප්‍රතිපාදන වලට අනුව 2008 පෙබරවාරි 01 දින අංක 1534/18 දරණ අති විශේෂ ගැසට් පත්‍රයෙන් පනවා ඇති රෙගුලාසි වලට අනුව උපද්‍රවකාරී අපද්‍රව්‍ය කළමනාකරණය කළ යුතුය. එ අනුව එකී ගැසට්පත්‍රයේ -8 වන උපලේඛනයේ සඳහන් අපද්‍රව්‍යන් උත්පාදනය කිරීම, එකතු කිරීම, ප්‍රවාහනය කිරීම, ගබඩා කිරීම නිෂ්කර්ශණය කිරීම, ප්‍රතිචක්‍රීයකරණය කිරීම, හෝ බැහැර කිරීම සඳහා මෙම අධිකාරිය විසින් නිකුත් කරනු ලබන බලපත්‍රයක් ලබා ගත යුතුය. එකී බලපත්‍රය සමග පනවනු ලබන කොන්දේසි වලට අනුව එකී අපද්‍රව්‍ය පරිසර හිතකාමී ලෙස කළමනාකරණය කළ යුතු වේ.

අතිගරු මහින්ද රාජපක්ෂ මැතිතුමාගේ දර්ශනය මත ක්‍රියාත්මක වෙමින් දැන් රටේ සෑම ප්‍රදේශයකම ජනතා සුව පහසුව සඳහා වන උයන්, පැන් පොකුණු හා සොබා සුන්දරය සිටි මනරම් ස්ථානද ඉදි කෙරේ. මේ සඳහා රාජ්‍ය හා පෞද්ගලික ආයතනයන් ද, රාජ්‍ය නොවන සංවිධානද, පොදුවේ පරිසරයට ඇලුම් කරන ප්‍රජාවද එක සේ සම්බන්ධ ව සිටීම අප සැමට ඉමහත් සතුටකි.



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Beyond MSW

What comes to your mind when you hear of waste disposal? Is it a mountain of vermin-infested domestic garbage? For many people, the problem of municipal solid waste disposal (MSW) is the foremost concern in the issue of solid waste management. However, with the systematic implementation of such strategies as composting, the manufacture of biogas, and recycling, both by the Government and by households, this problem will be managed satisfactorily in the near future. In contrast, there is an issue which has, so far, not been given the attention that it deserves, and which may bring greater risks in the long-term because the solutions are far more complex and the consequences far less understood. This issue is the releasing of heavy metals and unused medicine into the environment from domestic and industrial sources.

Developments in technology and products that make our lives comfortable have led to unexpected and unprecedented dilemmas in waste management. Every household has become a potential source of hazardous waste, in the form of discarded CFL bulbs, batteries, LCD screens, medicines etc. Exposure to heavy metals in these products can cause a range of mild to serious illnesses. The challenge today is to address the health and environmental impact of such materials that are being slowly released into the air, soil, and water over a period of time. This issue cannot be answered with certainty and easily because it is difficult to comprehensively measure either the quantity of substances being released or the extent of possible long-term effects including health. One aspect we see and hear is the ever increasing volume and costs for drugs, diseases that are unheard of earlier, more people seeking specialized care including cancer treatment and ever increasing number of pharmacies around the country. Therefore it is imperative that serious attention be given to this issue.

Since such waste must be disposed of in a scientific manner using specialized equipment, the onus falls on companies to take the necessary steps. One solution is for companies to take responsibility for their own products 'from cradle to grave'. A company that manufactures and/or sells products that require specialized methods of disposal should create a mechanism whereby consumers can return the used products to be disposed of safely. The cost of such an

operation can be built into the price of the product so that the company does not have to bear a significant loss. In addition, financial incentives and enabling environment must be created by the Government in order to motivate companies. Greater recognition must be given to companies that are making advancement in scientific waste management, be it through awards or other incentives, so as to prompt both consumers and manufacturers to make wise choices. With right awareness and incentives in place the companies marketing products containing heavy metals and medicines could meaningfully participated in innovative CSR programs that would help environment as well as national health.

There have certainly been some positive developments in this area in Sri Lanka with companies like Holcim using their resources and expertise to spearhead methods of scientific waste management. However, this remains the exception rather than the norm. Before the needed action is taken there must first be a significant change in attitudes of all stakeholders: national planning, health authorities, local government services, citizens and private sector. It must be recognized that development cannot be measured in monetary terms alone. For instance, we have a booming health care industry which one might argue as a way of providing employment and increasing the contribution to economic growth as well. However, there is a hidden cost which is the loss of productivity due to illness, draining of foreign currency for drug imports and those who choose to opt for medical care abroad due to the complexity of diseases. On the other hand, investments made in understanding and preventing pollution may not initially seem profitable or obvious, but has the potential to bring greater long-term benefits for the environment, the population, and the economy.

The need at this point is for a few key entities including the Government, leading companies with an environmental conscience, and the media, to create a favourable atmosphere within which such changes can take place. Once there has been an initial push in the right direction, scientific waste management including the "attention on the life cycle of products" will gather momentum in the country and become a self-sustaining phenomenon.



Mr. S M D P AnuraJayatilake
 Director General
 South Asia Cooperative Environment Program

Regional efforts on environmental protection and management with special reference to south asia

Overview

South Asia is one of the most diverse regions in the world. Bordered to the north by the Himalayas and to the south by the Indian Ocean, covers a diversity of ecosystems from lush tropical forest to harsh, dry desert. The region covers almost one twentieth of the earth's surface and provides a home for about one fifth of the world population. The degree of urbanization in 1999 ranged from 7 percent in Bhutan to 33 percent in Pakistan. Mumbai, Calcutta, Delhi, Karachi and Dhaka are fast growing cities with population more than 10 million.

South Asia is home to 14 percent of the world's remaining mangrove forests and the Sundarbans found between Bangladesh and India is one of the largest continuous mangrove stretch in the world. 6% of the world's coral reefs are in the South Asian seas. The atolls of Maldives and Lakshadweep islands of the region, are biodiversity rich marine habitats. Hindu Kush Himalayan belt is home to over 25,000 major plant species, comprising 10 percent of the world's flora. (www.sacep.org)

Many countries of the region have taken actions for the protection and management of the environment. They are also party to many multilateral environmental agreements requiring them to work cooperatively for the mitigation of concern issues.

Establishment of South Asia Cooperative Environment Programme (SACEP)

Identifying the need to face the many environmental and development challenges common to the countries of the region, South Asia Co-operative Environment Programme (SACEP) was established in 1982 by the governments of South Asia as an intergovernmental organization. SACEP member countries are Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. The SACEP Secretariat is being hosted by the Government of Sri Lanka and it is located in Colombo.

The Mission of SACEP is to promote regional co-operation in South Asia in the field of environment, both natural and human in the context of sustainable development

and on issues of economic and social development which also impinge on the environment and vice versa; to support conservation and management of natural resources of the region and to work closely with all national, regional, and international institutions, governmental and non governmental, as well as experts and groups engaged in such co-operation and conservation efforts.

SACEP is also the Secretariat for the South Asian Seas (SAS) Programme which is one of the Regional Seas identified by the United Nations Environment Programme (UNEP). The member countries of SASP are Pakistan, India, Bangladesh, Sri Lanka and Maldives. The Inter Ministerial Meeting (IMM) will be held back to back with SACEP Governing Council to decide on SASP annual work programme.

SACEP initiated Major Regional Projects

Since its creation, SACEP has implemented a number of projects and programmes in the areas of environment education, environment legislation, biodiversity, air pollution, and the protection and management of the coastal environ. SACEP is also an appropriate forum for action on trans boundary environmental issues. These are issues where the geographical scope or impact extend beyond national boundaries.

Malé Declaration on Control and Prevention of Air Pollution and Its Likely Trans - boundary Effects for South Asia

To cope up with the issue of Trans-boundary Air pollution in South Asia, Male Declaration on Control and Prevention of Air Pollution and Its Likely Trans-boundary Effects for South Asia was adopted in Male, Maldives in April 1998 at the Seventh Governing council of South Asia Cooperative Environment Programme (SACEP). The Programme is implemented by UNEP/RRC. AP.

This programme is a significant efforts which encourages intergovernmental cooperation to combat the transboundary air pollution problem

The implementation of the Male Declaration was envisaged in four phases. The Phase IV activities are now being implemented. The current Phase, focuses on sustainable financing mechanism and selection of regional centers on air quality and impact assessment studies. It also continues to conduct the impact assessment activities on crop, health and corrosion and regular monitoring.

Regional Oil and Chemical Pollution Contingency Plan for South Asia

A Regional Oil and Chemical Pollution Spill Contingency Plan and associated MoU were developed in association with the International Maritime Organization for enhanced cooperation in the event of an Oil or Chemical spill in South Asian Seas region. The 4th Inter-governmental Meeting of Ministers (IMM) held in Jaipur, India on 22nd May 2008, requested SACEP to finalize the Regional Plan and MoU as a matter of High Priority. Once all the countries have signed the MOU, SACEP will carry out further action on the implementation of the Plan.

Blue Flag Beach Certification Programme for South Asia

SACEP/SASP in collaboration with the Foundation for Environmental Education (FEE) Denmark, and the financial support of UNEP took the message of “A Clean beach - A Tourist Haven” for promoting sustainable tourism in the South Asian Seas region. The Blue Flag is a voluntary exercise and certification is awarded by FEE. This exclusive eco-label is presently awarded to more than 3200 beaches and marinas in 38 countries worldwide.

SACEP organized National Workshops in Bangladesh, India, Maldives and Sri Lanka 2010 in collaboration with the National Focal Points to have discussions with stakeholder in member countries to propagate the idea of beach certification. These workshops provided a platform to further development of national programs. Individual countries have agreed to pursue a follow up on the Beach Certification Program.

In addition SACEP is carrying out Beach Cleanup Day Programs to coincide with International Coastal Cleanup day

Environmentally Sustainable Transport (EST)

The Ministry of the Environment, Government of Japan, together with United Nations Centre for Regional Development (UNCRD), established the “Regional EST (Environmentally Sustainable Transport) Forum in Asia”

in 2005. The major objectives of the Regional EST Forum in Asia are:

- Facilitate policy dialogue and provide a strategy for sharing best practices, policy instruments, tools, and technologies in relation to various aspects of EST among Asian countries.
- In consultation with the subsidiary expert groups, facilitate and provide necessary advisory support for the formulation of national EST strategies and action plans on EST for selected countries.
- Support the implementation of action plans into practice through the participation of international organizations and international development and donor agencies.
- Help establish linkages with other ongoing regional and international activities/initiatives in promoting EST.

In 2007 SACEP signed a MoU with UNCRD to promote Environmentally Sustainable Transport in the South Asian Region. For the first time participants from all the Eight South Asian Countries participated in the South Asian EST Forum. This program is continuing with SACEP providing assistance to national governments/ focal points for implementation of EST concepts in their respective countries.



Ms. Sherine Perera
Director Environment
Board of Investment of Sri Lanka

Promotion of investment with emphasis on waste management

The Board of Investment of Sri Lanka recognizes that private investments are powerful catalysts for economic growth and innovation. The BOI promotes and facilitates investments, with special emphasis on targeted sectors. The rapid changes in the international environment have, however, generated fierce competition to attract direct foreign investments, raising various challenges to be met. Out of these, a vital component is environmental accountability. The BOI has developed a dedicated team for the sound environmental management of projects located within the EPZ and individual enterprises outside the EPZZ/IPP, licensed under the BOI Act.

Enterprises have sought waste minimization solutions through Cleaner Production practices, through advanced innovative solutions for resource optimization, and through water & energy conservation. They are also given support to adopt sound environmental management practices in order to compete in the international market.

Reducing the environmental impact and moving towards Zero Waste involves encouraging recycling and reducing reliance on landfills for waste disposal. Waste is a resource for those who recycle and reuse. As such, waste should not be disposed of in landfills, but should be sorted for recycling, leaving only a limited amount to be treated.

These initiatives are carried out through measures such as:

- Landfill restrictions for specific waste types.
- Separate collection of specific waste types such as food, to avoid contaminating other materials, thereby increasing reuse and recycling opportunities.
- Improved information on different waste sources.
- Ensuring proper disposal of scheduled waste.

Among the Licensed projects of BOI is Geocycle Sri Lanka, which is the Waste Management Division of Holcim (Lanka) Ltd. This enterprise is geared to provide solutions for industrial waste ranging from textile waste to pharmaceuticals, which are categorized as scheduled waste within Sri Lanka. Therefore, it relieves the burden of waste disposal for industries and businesses in a systematic

manner according to the environmental standards of Sri Lanka. The use of waste to generate energy is a sustainable mode of recycling which Geocycle has made use of in this project. In addition, reusing waste materials is encouraged as much as possible by the BOI, which contributes to the livelihood of low income communities. Electronic waste is exported by companies to China and other destinations for recycling.

An example is set at the Katunayake EPZ, which was established as the first Free Trade Zone in Sri Lanka in 1978 by the BOI {formally the Greater Colombo Economic Commission (GCEC)}. As a key player in industrial waste disposal operations of M/s, Geocycle has made a commendable improvement in the solid waste management at the EPZ. The BOI is in the process of adding more Zones in a progressive manner for the better management of industrial waste.



It should be noted that the BOI is looking into the challenges of Export Processing Zones with the aim of becoming “greener” with the assistance of all stakeholders in order to contribute towards the sustainable development of the country.



Mr. Hemantha Withanage
Executive Director, Centre for Environmental Justice

NO ADDED LEAD (Pb)

A success story of saving the lives of millions of children in Sri Lanka

You may have noticed that some decorative paints now claim to have “no added Lead”, or “no added Lead, mercury and cadmium”, while others claim to be “Lead safe”.

It was shocking when our research in 2009 found some decorative paints with 137,325 parts per million (ppm) Lead, which is one of the prime toxic substances in the world. After a three year battle, the Centre for Environmental Justice was able to make “low Lead” paints available across the country. The new standards enforced in January 2013 stipulate a limit 600 ppm of Lead in enamel and floor paint and 90 ppm in emulsion and toy paints. Sri Lanka is now among a very few countries to use low Lead paints.

According to the World Health organization, Lead is a prime toxic. It affects over 40 million children worldwide, over 97 percent of whom live in developing countries. Lead poisoning statistics show that there is still a high number of people adversely affected by the metal’s harmful effects.

The primary source of Lead exposure among children is Lead-based paints, and Lead-contaminated dust and soil that is found in and around old, deteriorating buildings. The other major source is Leaded gasoline. Sri Lanka is fortunate to have stopped using leaded gasoline in 2003, soon after the World Summit on Sustainable Development which agreed to eliminate Lead in gasoline and Lead in paint. After a decade, most countries have stopped using Leaded gasoline, but the Lead in paint is still an unresolved danger.

Lead is a metal with no known biological benefit to humans, and exposure to it is particularly dangerous since it has the potential to cause irreversible health effects before it is clinically recognized, such as hypotension, problems of the central nervous system, anemia and diminished hearing acuity. It is common knowledge that Lead is added to paints to speed

drying, increase durability, retain a fresh appearance, and resist moisture that causes corrosion. The danger is that the widespread use of Lead-ridden paints exposes humans, especially children under six, to Lead poisoning.

Children are at greater risk due to the fact that it affects their central nervous system and the poisoning is irreversible. Lead encephalopathy is a medical emergency and causes permanent brain damage in 70 - 80% of children affected by Lead, even those that receive the best treatment. Blood Lead levels as low as 5µg/dl in children were found to be associated with reduced academic performance.

In 2010, the Centre for Environmental Justice, in collaboration with international POPs Elimination Network (IPEN) and the Indian NGO, Toxics Link, carried out a global scientific study of “Lead in New Decorative Paints”. Altogether 10 countries participated in this study. The findings revealed that, among tested enamel paints in Sri Lanka, 69% exceeded the current standard of 600 ppm. The highest content of lead was 137,325 ppm (14%), 1,526 times greater than the U.S. limit of 90 ppm and 228 times greater than the Sri Lankan limit of 600 ppm. Other samples also contained 133,463 ppm, 55,237 ppm etc. It was found that some companies that produced “low Lead” paint for the international market, produced leaded paint for the local market, committing an injustice against our children.

Lead chromate is added to paint to get greenish or yellow colors. Red Lead is added to most anticorrosive paints. Lead dioxide is used in making white paint. Adding Lead to emulsion paints (wall paints) was discontinued some years ago and is not a problem today. But lacquers, enamel paints, and floor paints still use Lead material, at least in the yellow, green and red paint.

The Consumer Affairs Authority did not believe it was within their jurisdiction to limit the levels of Lead in paint since it mostly concentrates on food items. Instead, Sri Lanka Standards Institute (SLSI) agreed to set the new standards. However, they did not agree to reduce the level in floor paint and enamel paint to 90 ppm, which is the agreed level for Lead in emulsion and toy paints. Countries such as the United States and European countries have limited the Lead level to 90 ppm in all paints.

Since the paint is harmful to growing children under the age of six, CEJ and Dulux paint argued that children are first contaminated by floor paint when babies start crawling. The truth is that some big manufacturers did not want to reduce the level to 90 ppm, perhaps due to the difficulty of devising new paint formulas. Some academics thought it would not be easy for small and medium manufacturers (SMEs) to cope with the new formulations. Proving them wrong, some of the big and small manufacturers have reduced the level of Lead to either “not detectable” or to below 25 ppm. Most of them have managed to reduce the Lead level in their paint just by using unleaded raw materials. At a discussion with all the stakeholders, including paint companies, in November 2010, it was agreed that the level of Lead in enamel paints would be reduced to less than 90 ppm and it was requested that this be included in the SLSI specifications. This is still under consideration by the authorities.

As we all know, SLSI standards are voluntary. CEJ brought the matter to the Supreme Court with a petition asking for the reduction in the level of Lead in paint in order to protect children’s health. As a result, the Consumer Affairs Authority made a gazette notification (Gazette Extra Ordinary No 1725/30 on 30th of September 2011) establishing new mandatory standards for lead levels in paint to take effect from January 1st, 2013.

The CEJ’s effort to save millions of children from Lead contamination became successful with this initiative. However, be aware that old paint in the house, school or playground will continue to contaminate children unless painted over with unleaded paint.



Mr. Samantha Gunasekara
Deputy Director of Customs
Biodiversity Cultural & National Heritage Protection Division Sri Lanka Customs.

Stay alert to waste coming across borders

Day by day we generate, accumulate and dispose of more and more waste, including electronic waste. This brief article aims to draw your attention an aspect of which is not given much attention. It is the waste being imported here without us being aware that it is waste.

Electronic waste or e-waste is a growing problem in this area. Various types of electronic devices such as laptops, desktops etc., which are outdated or at the end of their life span, are brought into the country as donations. Used electronic equipment is also imported here by way of the un-accompanied personal luggage of foreign employees, especially those employed in the Middle East, Korea, and Japan. Such items include used T.V.s, washing machines, dish washers, generators, and emergency lamps. Although they may be obtained free of charge, a considerable amount of money has to be spent on freight and handling charges to import those heavy articles. The host countries get rid of their waste while our country accumulates mountains of e-waste.

The importing of old refrigerators with CFC gases is under control now, but old vehicles, old machinery, and used motor parts are still imported in large numbers. There were a number of instances where Customs had to intervene in attempts to dispose of hazardous chemicals which landed here on an emergency basis. Customs even successfully controlled certain attempts to import nuclear hazardous waste here under misleading commercial terms.

It is evident that various types of imported agrochemicals contain a high percentage of heavy metals including Arsenic and Mercury. There is research in scientific publications to show that imported fertilizers such as Triple Super Phosphate are contaminated with a high percentage of heavy metals and radioactive materials. Another waste importing source is old batteries brought for the Lead processing factories under BOI. There are cases where the waste

of those factories is disposed of in environmentally sensitive areas.

Importing of low quality mobile phones with a very short life cycle and their batteries is also a growing problem. In addition, the importing of recycled polythene raw material is an area that needs to be given attention as the production of particular raw materials cannot be re-cycled. As these raw materials are cheaper, there is a trend to import more raw materials of the same type.

Importing contaminated polythene waste, foam rubber waste, plastic waste, etc. under the declaration of genuine goods, and then abandoning the shipment without clearing it is another malpractice adopted to dispose of waste in Sri Lanka. Importing over issued newspapers and magazines is another method of waste disposal in Sri Lanka.

Gazette notifications on CFC gases under the Montreal Protocol and Chemical Weapon Convention are some of the applicable existing regulations to control such imports, but there are loop holes. Therefore, national legislation should be formulated in absence and strengthened in presence to control the importing of waste. National regulations on the Basel Convention on hazardous waste, the Stockholm Convention for persistent organic pollutants, and the Rotterdam Convention for hazardous chemicals & pesticides should be properly formulated.

In an attempt to eradicate this menace, Sri Lanka Customs has recently launched a program to collect the e-waste generated in their office premises. This is in collaboration with Greenlink Lanka, a collaborative company of Geocycle.

The country should have the vision, mission, and policies towards a waste free Sri Lanka. The gaps should be identified, addressed and filled, along with appropriate awareness programs. Only then will the dream of a waste free Sri Lanka become a reality.



Dr. (Mrs) Ajantha Perera
 Founder,
 National Program on Recycling of Solid Waste

Fitness in thankfulness

“Survival of the fittest” is a concept accepted by most. Hence, for many, “today” is spent becoming fitter for “tomorrow”. Exercise, good nutritious food, healthy drinks, and clean, secure homes are obtained to guarantee a place of safety in tomorrow’s world. Most of these activities cost a lot of money, however. Rarely do we realize that the true essentials for living are provided free of charge by the environment we live in. For example, oxygen, which we need from birth to death, is provided free of charge by the air that surrounds us. Water, in the form of rain, is provided free of charge to all life forms everywhere. Food crops we grow in our own gardens will bear fruits and vegetables for us to consume at no cost or at minimal cost. So the essentials for all life forms come absolutely free. The only missing ingredient in our human life style is the ability to be thankful for what we receive naturally from our own environment.

I hear people complaining everyday about how little they have and how difficult life is. This made me think hard about why people complain despite having so much. I soon realized that the problem is not with life, but it is in the way we humans think and act. We have simply become too lazy to make the most of what we have, and to learn the art of being responsible and resourceful. The art of being responsible is the key to success and happiness. “To whom much is given, much is expected”. We need to act responsibly in protecting the air we breathe, the water we drink, and the quality of the food we eat, for our sake and for the sake of others.

For a country like Sri Lanka, after 30 years of war during which development was an impossible task, today has become an important beginning for a developed tomorrow. Hence agricultural and industrial growth has become a must. However, agricultural growth and industrial growth should in no way hinder the common person’s accessibility to clean air, clean water, and clean food. Environmental laws and regulations are in place to achieve this. Every citizen in Sri Lanka who is involved in development work must abide by these rules and regulations. Here too one must be thankful for this guidance as these environmental tools ensure the sustainability of industries.

In my life, I have met a few people who have learnt the art of being grateful. A rag picker woman I met in Indonesia

told me that she came daily to the garbage dump to collect waste paper, plastic etc., so that she could sell it and earn enough money to send her son to college. She said that the knowledge that her son was gaining in school kept her working. Her confidence and her happiness told me that she had learnt the art of thankfulness. In Sri Lanka I spoke to a rag picker many years ago at the garbage dump of Meethotamulla. I asked him why he came to one of the dirtiest places in the country to earn an income. His simple answer was, “It is better than stealing”. So here are people who, without grumbling, have learnt the art of happiness in the circumstances that they are in.

One could even say that we find the most content and most fruitful people in the world in the most unexpected places. The work that the rag pickers do in fact brings relief to nature. They collect material which others have thrown away as garbage and put it to use. If we allow such non-biodegradable material to gather in the soil, the soil will become unfertile. So the work of the rag pickers helps keep the soil fertile. Perhaps we too need to join hands with them in protecting the soil of our motherland. By visiting many dump sites in the world and working among the garbage collectors and rag picker communities of Sri Lanka, I had the privilege of learning much from this poor, neglected group of people. One day a woman living in one of the tiniest houses in the shanties said to me, “I feel very lucky, I am sure I am happier and more satisfied than most of the rich people”. She has learnt to be thankful for what she has, even though by our standards it is not much. I took this as a personal challenge to achieve the same.

So I continue to say, “Be grateful for the air that you breathe, be thankful for the water that you drink, be responsible about the food that you eat, so that you and your neighbors may not be hungry”. The time has come for us to recycle not only the garbage we produce, but also the way we think and act.



Dr.(Mrs) Ajantha Perera among a group of Rag Picker women at the dump site in Indonesia



Mr. Jayavilal Fernando
Deputy Director General of the Environmental Education and
Awareness Division
Central Environmental Authority

An integrated solid waste management system for Dompe Pradeshiya Sabha

Municipal solid waste management is poorly performed by many Local Authorities (LAs) in Sri Lanka, including Dompe Pradeshiya Sabha, which is located in the Gampaha District of Western Province, and they of the need mainly for scientifically proven intermediate treatment systems and sanitary landfills, the latter being for safe final disposal of residual waste respectively. In this context, arrangement was made to set-up the first ever sanitary landfill in Sri Lanka at a site called Maligawatte, within the jurisdiction of Dompe Pradeshiya Sabha with the technical and financial support from Korean International Cooperation Agency (KOICA), Republic of Korea. Construction work of this landfill is currently underway and it is expected to complete the construction work by the end of this year.

This landfill, once completed, would serve as a model to demonstrate the importance of managing garbage in an environmentally friendly manner to prevent / minimize many environmental, health and social issues while granting an opportunity for the Sri Lankan experts to harness technical experience in the field of landfill construction.

In addition to the sanitary landfill it is also planned to construct a composting plant adjacent to the landfill with the financial and technical support from 'Pilisaru' National Solid Waste Management Project implemented by the CEA.

The objectives of the sanitary landfill Project are;

- To enhance the capacity of the policy makers and government officials in charge of wastes management;
- To establish an integrated waste management system with supportive policy measures and programs for the successful implementation of the system;
- To conduct an inventory survey on the sources, volume of generation, collection and/or treatment of household waste
- To design and implement a safe and efficient collection system for household waste and

- To construct a sanitary landfill and other related infrastructure.

There would be facilities to isolate and treat the leachate generated in the landfill and liner will be in place to prevent soil contaminations. Facilities would also be there to manage landfill gas and storm water. Lining systems are installed for the purpose of handling the leachate which is produced from the water contained in waste itself, during waste decomposition and storm water flow.

Geo textile is installed on underneath of the side bank and above which, Bentonite mat and Hi-Density Polyethylene (HDPE) liner are installed simultaneously. On top of this, a Geo-textile layer is laid again as the final layer to protect underneath liners. In Bottom layer the drainage line for ground water is buried at the lower most part of the landfill and that will be in use for a long time. Above the drainage line a Geo-textile with metal layer is laid and impermeable layer of Bentonite soil mixture is then laid to maintain the required permeability coefficient of 1×10^{-7} cm/s. A 1.5 mm thick HDPE sheet will be placed on top of the bentonite soil layer and finally Geo-textile will be laid to protect underneath liners.

The landfill is designed with its floor tilted so that leachate formed inside the landfill will flow towards the leachate removal pipes located at the first level of the landfill floor and finally to the leachate treatment plant.

Other Key facilities that would be constructed at this sanitary landfill include storm water retention reservoir, Roads (access roads, roads for landfill management, and roads within the landfill), Rainwater and underground water drainage facility, Administration building and auxiliary facilities, tyre wash basin and weigh bridge etc.

The estimated lifespan of the landfill is 15-20 years and a proper management system will be in place to ensure effective operation and maintenance of the landfill.



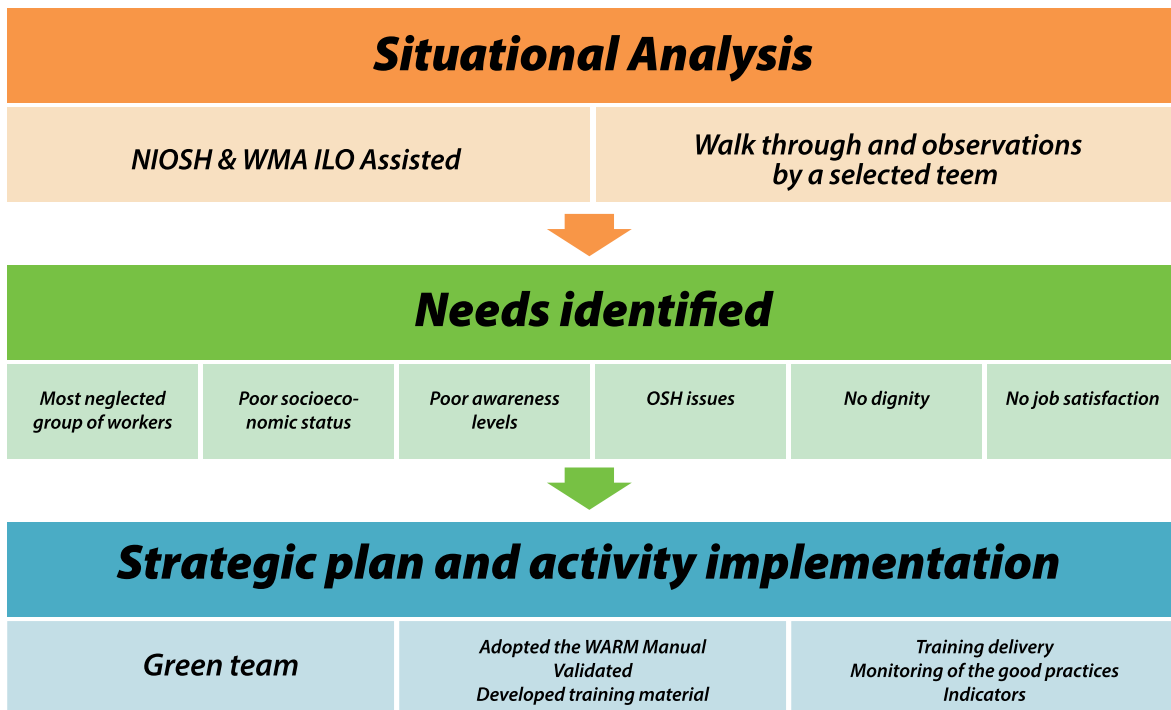
Dr. Champika Amarasinghe
 Director General,
 National Institute of Occupational Safety & Health Sri Lanka

GREEN JOBS ASIA PROJECT IMPLEMENTATION National Institute of Occupational Safety & Health Sri Lanka

Waste handlers are a group of workers who are engaged in the collection and disposal of waste generated in different localities. This is an essential job task which is considered a “Brown Job” due to the following factors: social justice, occupational safety & health, dignity of workers, awareness levels and socio-economic status. According to the Green Jobs Asia Project objectives, the National Institute of Occupational Safety & Health was assigned the task of converting this so called “Brown Job” into a “Green Job”. The ultimate goal of this project was to enhance the productivity of the workers and to create a healthy work force.

	<h3>Brown job</h3>	<ul style="list-style-type: none"> • <i>Social justice</i> • <i>Occupational safety</i> • <i>Dignity of workers</i> • <i>Awareness levels</i> • <i>Socioeconomic status</i>
	<h3>Green job</h3>	<ul style="list-style-type: none"> • <i>Minimize absenteeism</i> • <i>Occupational Accidents</i> • <i>Minimizing health budget</i> • <i>Healthier work force</i>

The following strategies were adopted to change the Brown job into a Green Job: a situational analysis was carried out and a needs assessment was done to develop the strategic plan for the project.



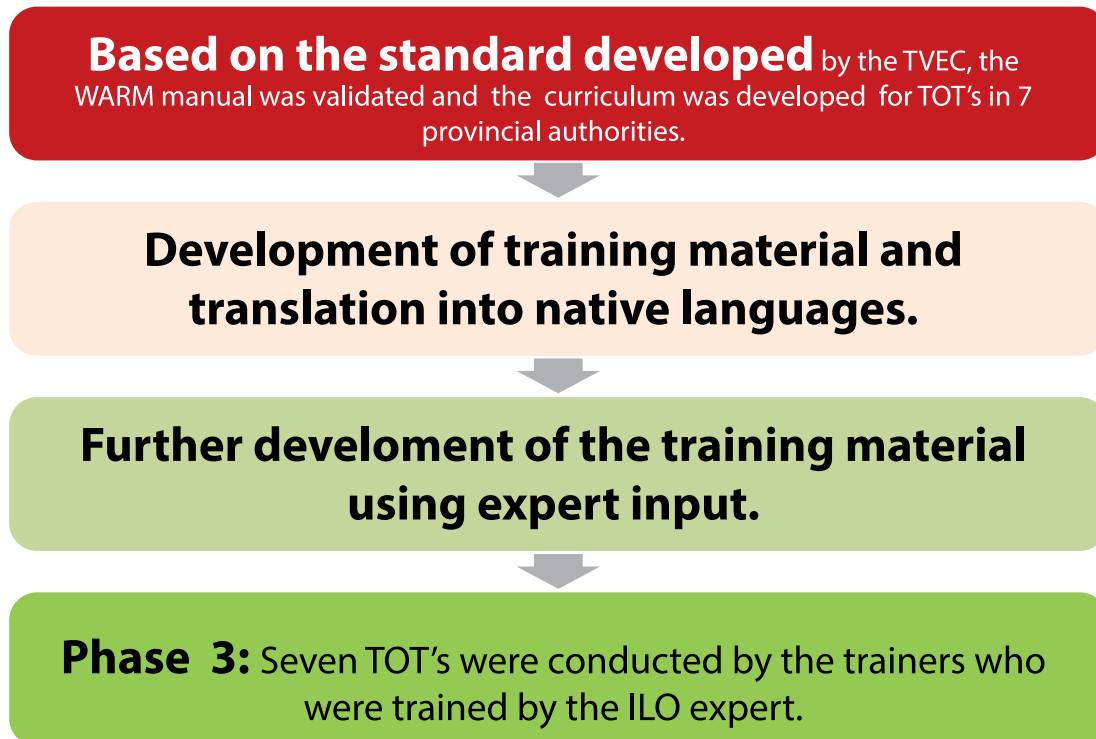
A Green team was formed comprising the NIOSH, WMA, ILO and other stakeholders as the working group. An awareness seminar was organized by the ILO with the participation of constituents such as Government participants, employers in local authorities, and employee organizations. A steering committee was formed with tripartite constituents as a decision maker for the project. First, the training curriculum for the trainers and trainees was developed based on the WARM manual. This was then translated and validated by the tertiary vocational and educational curriculum.



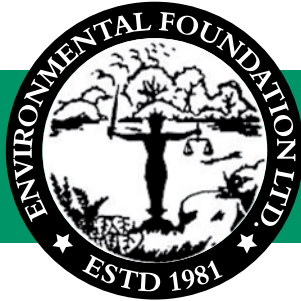
Phase 1

<p>Stakeholders: NIOSH, WMA, TVEC, employees, and the community</p>	<p>WARM manual – adopted, translated into Sinhalese & Tamil and printed</p>	<p>WARM manual validation with the consensus of the tripartite constitu- ents, NIOSH, WMA, ILO, TVEC</p>
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Phase 2 of the project was a training of the trainer session and 30 trainers were trained. After the TOT, the trainers conducted special one day training sessions for waste handlers. It was interactive training based on the awareness levels and physco-social levels of the workers.



- 48 cascading training seasons were conducted by NIOSH Green. all the stakeholders involved in the waste handling and management sector in the western province.
- Four thousand participants, including waste handlers, truck drivers, waste sorters, waste collectors, and members of the community, were trained. NIOSH is the only government organization with the mandate to create a culture of safety in the country through awareness, training and research into the occupational safety & health of any occupational group. Accordingly, we lend our support to any organization which desires to create a safer working and living environment. NIOSH appreciates the great work that the Geocycle team of Holcim (Lanka) Ltd. does in creating a greener world. Furthermore NIOSH would be very happy to join hands as a National Body, with the Geocycle team to protect the green work world.
- Based on the employee and employer requirements, occupational medical clinics were held and the workers' health status was assessed. Necessary personal protective equipment was provided by the ILO and, as the final outcome of the project, an occupational safety and health guideline was developed and distributed among



Environmental Foundation Limited (EFL)
146/34, Havelock Road, Colombo 5.

Fighting the waste war

Solid waste management is a pressing issue in both urban and rural areas of Sri Lanka due to the lack of proper collection and disposal systems. Approaches such as composting, recycling and land filling have been taken by different stakeholders to minimise the amount of solid waste being disposed and to manage it hygienically. However, one of the main challenges has been the disintegration of such approaches.

Large scale garbage dumping by municipal and urban councils and private companies in an unregulated and unplanned manner causes severe harm to the environment, while assisting in the increase of many mosquito and bacteria borne diseases in the area. In addition, unmonitored garbage dumping creates an unpleasant environment and releases a foul smell which causes great inconvenience to residents living in close proximity to garbage dumping sites.

In the case of water bodies being present near garbage dumping sites, there is a high possibility of the water being polluted and any marine habitats present being destroyed due to the harmful chemicals being emitted.

It is the fundamental right of every Sri Lankan citizen to enjoy a clean and safe environment. It is with the

intention of ensuring that the public is entitled to their rights that the Environmental Foundation Limited (EFL) has taken legal steps in order to resolve the issue of unmonitored garbage dumping in Colombo. One such case is the Karadiyana dump site, a 25 acre plot of land, where two Municipal Councils (Dehiwala-Mount Lavinia) and two Urban Councils (Boralesgamuwa-Kesbewa) dump approximately 300 metric tons of garbage on average per day.

In 2009, a case was filed by residents of the Karadiyana area at the Kesbewa Magistrate's Court stating that illegal garbage dumping was taking place in Karadiyana, affecting natural water bodies such as the Weras Ganga and the Bolgoda Lake, and causing illness to residents. EFL, as the eighth added respondent in the case, presented to the court the negative effects of unplanned large scale dumping and the effects on the environment and people. The Supreme Court ordered that EFL supervise the Karadiyanagarbage dumping site on a regular basis together with the Kesbewa Magistrate for the better management of garbage dumping at this location. EFL, taking a lead role, together with the Central Environmental Authority (CEA) and the Western Province Waste Management Authority (WMA) continues to monitor the activities of the site, in



EFL taking a lead role together with the Central Environmental Authority (CEA) and the Western Province Waste Management Authority (WMA) to continue monitoring the activities of the Karadiyana dump site.

order to ensure the fundamental right of Sri Lankan citizens to enjoy a clean and safe environment, as directed by the Supreme Court.

To ensure that a clean environment for residents within the area is maintained, the people filed a case in the Supreme Court claiming that the Colombo Municipal Council (CMC) and the private garbage collecting company, Burns Trading (Pvt.) Limited, do not sufficiently regulate the dumping of garbage within the city limits. The residents also stated that the collecting of garbage was not being carried out in a proper and routine manner.

EFL became an added respondent to strengthen the case for the people and requested that the Court intervene to ensure the regular collecting and monitoring of garbage. The Supreme Court issued an interim order stating that constant monitoring, collecting and dumping of garbage within the Colombo city limits should be conducted by the CMC. The Court also stated that whenever possible, the conversion of garbage into energy should take place at the Kerawalapitiya Centre (using the garbage at the Blumendhal garbage dumping site). This would be carried out under the “Waste to Energy” project by the Waste Management Authority. The Supreme Court also declared that no further garbage dumping should take place at Blumendhal. This case is to be taken up once in three months to monitor the progress of court directives and to oversee the situation related to garbage dumping.

In addition to fighting the fundamental rights violation in un-regulated garbage dumping, EFL also conducted a solid waste management component under the Green Recovery Program funded by the American Red Cross and the World Wildlife Fund. Under the Green Recovery Program, several interventions were initiated to close the loop in waste management through an integrated approach to solid waste management. The partnership helped tsunami affected families adopt environmentally friendly waste management practices. A ‘backdoor’ approach to waste composting and separation was introduced under the partnership through

the promotion of community home gardening. Training in organic home gardening techniques and composting was provided along with samples of compost, seeds and plants. As a result, households were able to enjoy the benefits of composting immediately through pesticide free vegetables in their home gardens. This in turn helped to improve nutrition and to increase food security and household savings. While making compost, the households were also encouraged to separate recyclables, and recycling business networks were developed to collect the recyclables from the villages. Waste minimisation through refuse, reduce and reuse was promoted through community campaigns.

EFL worked with the American Red Cross Water and Sanitation Program and the Matara Sri Lanka Red Cross Society (SLRCS) staff to train volunteers and community leaders as social mobilisers to reach a wide range of beneficiary families at village level. Often the missing link between separation and recycling is a collection network for recyclables, especially polythene and plastic. In order to close the loop in waste management, EFL obtained the support of a local youth group, Sumithuro Api, who had already taken the initiative to engage in paper recycling from paper-based waste. The group, after receiving training, engaged in collecting polythene and plastics from villages, which were then sent to local recycling centres. The program supported T. W. Polypack in expanding its polythene recycling factory in Ahangama, Matara, by purchasing machinery and constructing a new factory to increase their recycling capacity. In Dadalla, Galle, Roneasha Polymer Industries was supported to revive a polythene recycling plant through private, non-government and local government partnerships with Arthacharya Foundation and the Galle Municipal Council to improve recycling in the Galle district. These businesses have revived and established new polythene collection networks to absorb material to fulfil their factory capacities, thereby developing market-based recyclable collection systems in their respective districts.

Compost piles at the Weligama Urban Council, one of the pioneer urban councils in the country in composting municipal solid waste. EFL supported the expansion of the Weligama Urban Council composting facility.



At the urban level, due to the lack of space, people depend on local authority services for waste management. In order to complete the loop at the urban level, the partnership supported the Weligama Urban Council, a pioneer in the country in composting municipal solid waste, to expand its composting yard and storage facility for recyclables. Social mobilisation through approaches such as awareness, sensitisation, motivation and community action by 'shramadhana', was key in binding the technical components when closing the loop in wastemanagement

The partnership extended its work to the Ampara District in the East to support the beneficiaries of the Community Reconstruction and Rehabilitation Program (CRRP) at the invitation of SLRCS and the International Federation of Red Cross and Red Crescent Societies (IFRC). EFL partnered with Gami Seva Sevana, a pioneer in organic home gardening in Sri Lanka, to carry out community training.

The project targeted households in the Pottuvil

and Thirukkovil Divisional Secretariat areas, where women are burdened with the responsibility of providing nutrition for the family under dire economic conditions. Some households were headed by women who had suffered both from the ethnic conflict and the 2004 tsunami. The area experiences an annual drought period, during which the shortage of water and the rise of food prices are common, with the burden being disproportionately borne by women. Similar to the program in the South, beneficiaries were supported through training and the provision of materials, with an additional focus on water management. The program mobilised existing community networks set in place by the CRRP project, and worked with already established community based organisations and community leaders.

EFL has not only been fighting for garbage free cities but has also conducted and supported many initiatives for bettering solid waste management practices in Sri Lanka for the betterment of its communities.



N. Arosha Hemali
Project Engineer Development - Geocycle
Holcim (Lanka) Ltd

Geocycle Sri Lanka stepping into MSW

Issues created by wastes are evident in many parts of the country, leaving huge environmental impacts to the future generations. Daily estimated waste generation in Sri Lanka amounts to about 6,700MT, where only 2,800 tons of waste is being collected daily. Most of the local authorities in Sri Lanka spend the largest portion of their expenditure for waste collection and disposal. But many of them struggle to have a sustainable waste management system which is vital to overcome.

Holcim, Geocycle has stepped into provide a sustainable solution for MSW by creating a recycling plant at Seeduwa, where there are two main industrial zones (Katunayake, largest EPZ in SL and Biyagama EPZ), country's largest housing scheme located at Raddolugama with 2600 houses, Sri Lanka's National airport – BIA and some key industries like Primart.

Disposing of unsorted Municipal Solid Waste (MSW) in a proper manner is a key challenge. The general waste collection is 3-4kg per day per household, so there is a large amount of waste being collected. Of this waste, 60% is biodegradable, but 10%- 15% is plastic and polythene which is a real burden to the environmental as it doesn't decompose for a long time. Currently, this MSW is dumped and burned in the open; hence it may emit toxic gases and will directly affect the surrounding environment and the community.

Holcim Geocycle has stepped in to provide a sustainable solution for MSW. The site is located at Seeduwain the Gampaha District, approximately 25 km away from Colombo.

As estimated, daily waste generation in Sri Lanka amounts to about 6,700 Mts. However, as reported, only about 2,840 Mts of waste is being collected daily, of which 58% is collected from Western province (According to NSWMSC et. 2007). To obtain a long lasting solution for the solid waste problem in Sri Lanka, an attitudinal change in the people with regard to 'waste' is essential along with tangible

solutions that can be provided to establish a proper real time Waste Management System.

Waste management is vital to the healthy functioning of a society. Improper waste management has negative effects on individual health and it also negatively impacts environmental health. Waste Management, as generally defined, is the process of collecting, transporting, monitoring, and processing or disposing of waste.

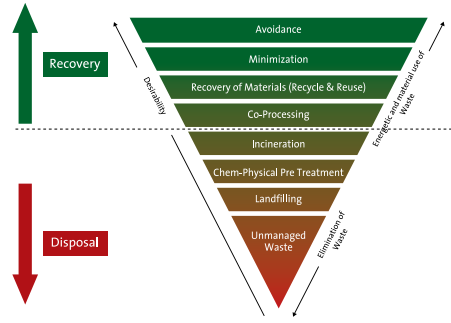
The aim of the project is to set up a waste management center to collect the municipal solid waste generated within a community in an organized manner and process the waste in an environmentally responsible way to minimize health risks and environmental impacts and maximize public acceptance of ecofriendly disposal methods. The project also aims to enhance the capabilities of the municipality officials, local communities, and industries with respect to proper Waste Management practices in order to sustain the mechanisms put into place.

The project was followed by a feasibility study comprising of two main studies: waste survey of MSW and Social Impact Assessment SIA. The plant capacity was designed based on the composition of waste in each waste category. Community concerns were to be addressed based on the recommendations of SIA.

A waste management hierarchy was applied to withstand the minimum energy loss to the environment as a whole. Avoidance and waste minimization were addressed with capacity building and training on waste management for the community. Next is the segregation of waste which can be used or recycled. Out of the balance material, co-process-able waste will be directed to cement kiln co-processing. Waste that is not co-process-able will be disposed of under any of the economical methods mentioned underneath.

Waste Management Hierarchy

Geocycle always respects the waste management hierarchy as a policy when providing a sustainable solution for industrial waste.



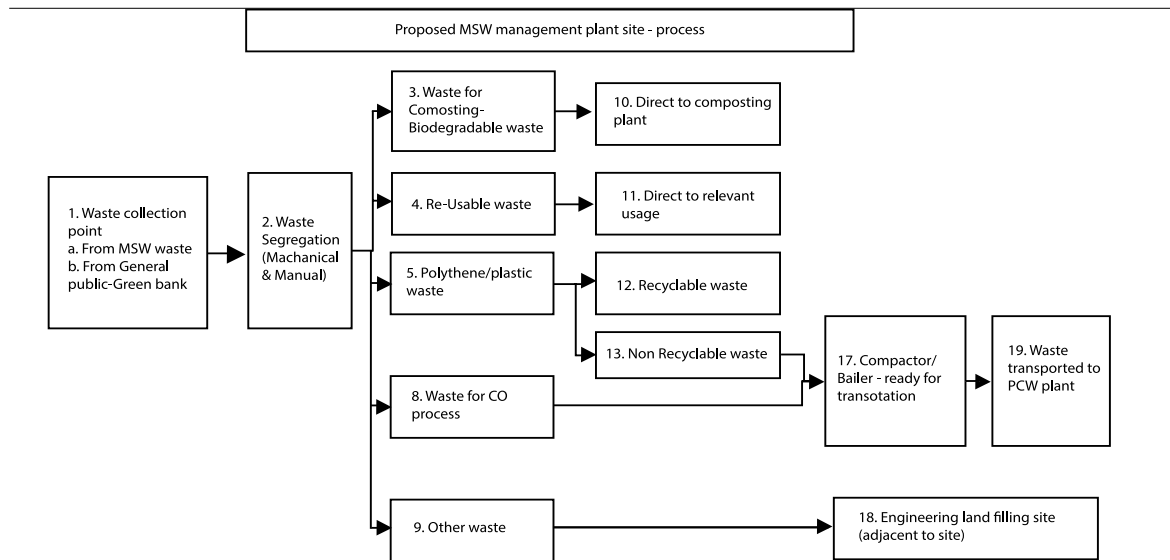
The existing waste disposal practice will be replaced by a material receiving and segregating facility in waste dump yards. At the facility, the waste received from the area will be collected and further segregated for recycling. All the similar materials will be collected together from the waste and then sent to industries which process and recycle the waste. The remaining waste which cannot be recycled or processed will be directed for making RDF or for co processing at cement kilns and the balance waste will be dumped at pilot land filling site set up adjacent to the facility.

Figure 01: Waste management hierarchy

The waste composition analysis indicated a considerable portion of biodegradable waste (63%) and recyclable & re-usable material such as paper, rubber, metal, glass, e- waste and bulbs (approximately 17%). Another 13% will be directed towards Refuse Derived Fuel (RDF) production or Co-processing. There will be 7% (comprising of Sand & stone and other large debris etc.) directed to any of the most socio-economic disposal options.



Picture 1: Current situation at the site



The above plant is an 86Mn LKR investment, which is financed by a German grant (26Mn LKR) donated for socio economic beneficial projects and by Holcim Lanka funds.

The target communities and the people residing within these areas will directly benefit from this project as they will have better living conditions free from diseases and infections otherwise caused due to open landfills and unorganized dumping practices. Waste management will keep the soil and

the water in the adjoining areas clean and safe for use by the public, thus benefitting their health and also enriching their livelihood.

Sri Lanka still depends on an agriculture-based economy. Therefore producing compost from biodegradable waste is the best option in the current context; and low tech and low cost strategies would be the most sustainable approach for Holcim to enter into the new waste channel of MSW while benefitting the community.



Mr. S. N. Hari
Asst. General Manager
Industrial Clothings Ltd.- Prime Polymers Division

Let's make a greener difference

Have you ever stopped to worry about the day you might be leaving planet earth in a space capsule towards an unknown destination? Fascinating idea indeed, until you realize that the planet earth is no more! You are leaving a dying home world, seeking the shelter of a suitable planet. Isn't it a painful thought? Though it sounds like a sci-fi plot, it reflects the possible apocalyptic future of the world we live in; unless we start to think seriously about how we pollute it, destroy it, and extract its recourses.

After successive decades of a golden industrial era, we are now facing the side effects of the manipulation caused by human kind. We are now forced to seek answers for diminishing natural recourses and increasing industrial waste.

You can tell how advanced a society is by how much of its garbage is recycled. And as any manufacturing process in an industrial grade causes pollution, now there is worldwide awareness of the downsides of mass manufacturing facilities that release dangerous particles of toxic waste and hazardous waste products into the atmosphere.

'Industrial Clothing Ltd, Prime polymers' is a fine example of an industrial organization that takes recycling and sustainable development seriously and takes the initiative towards saving the planet for the next generation.

Industrial Clothing Ltd, Prime polymers is part of a chain of companies - an industrial mogul with huge manufacturing facilities located in Pakistan, India, and Sri Lanka. The business line of Industrial Clothing Ltd, Prime polymers is manufacturing export quality medical examination gloves, chemical resistant gloves and mechanical hazard resistant gloves.

Industrial Clothing Ltd, Prime polymers has developed a fine reputation for glove manufacturing over the years and their productions are used in a vast variety of industries including automotive, medical, chemical, environmental, metal fabrication, food processing, pharmaceuticals, electronics, plastics, pulp and paper, and households.

Industrial Clothing Ltd, or the mother-ship of their business body, "Midas Sri Lanka", believes that sustainable development should be more than just a slogan. Hence they believe initiating a green movement alongside the manufacturing process is vital not as a favor, but as a responsibility. Sri Lanka is still green and blue and they intend to do their part to keep it that way.

Any manufacturing process causes an amount of pollution, so Industrial Clothing Ltd takes necessary steps to reduce that amount and keep it at a minimal level. In the process of producing 720 million pairs of disposable gloves and 31 million pairs of industrial coated gloves annually, there is a heavy use of chemical solvents such as chlorine, nitric acid, ammonium and DMF, which are marked as hazardous toxics if not handled with care. Used chemical solvents are included in a reusing cycle within the manufacturing process over and over again with 99% efficiency and the resulting useless hazardous waste sludge is handed over to Geocycle to be co-processed in their facilities.

Industrial Clothing Ltd was the first group in Sri Lanka's industrial sector to adopt the latest technology for DMF recycling with total material and heat balance. That project has received a Gold award from the Ceylon Chamber of Commerce in Sri Lanka.

Before 'Geocycle' was established, before establishing even an in-house hazardous waste management system, Industrial Clothing Ltd had to ship all their hazardous waste to Korea for disposal. As Geocycle provides a risk-free and agile disposing mechanism now, everybody can ease their minds about a proper hazardous waste management system!

That's not the end of the 'green' agenda of Industrial Clothing Ltd. As they understand the vitality of 3R concept, Reduce, Reuse and Recycle, Industrial Clothing Ltd has made many changes in

their processing system in the past few years. For example, earlier they consumed 800,000 Liters of Furnas oil for the purpose of generating heat in the manufacturing process, but now they have eliminated the usage of fossil fuels and turned to more eco-friendly biomass fuel.

As an attempt to save electricity, Industrial Clothing Ltd installed skylights, which allows them to eliminate the use of artificial light and absorb the power of natural sunlight instead. Midas was the very first group in Sri Lanka’s industrial sector to adopt skylights in all its manufacturing locations to reduce the power consumption of artificial lights.

Industrial Clothing Ltd holds the honour of being the first in the country to adopt the most modern ‘Double Former’ disposable glove manufacturing technology which consumes 25% less thermal energy for every glove produced in their facility. This system is more expensive and harder to maintain, which demonstrates their commitment towards sustainable development.

Inside the facilities of Industrial Clothing Ltd, the atmosphere they have created for the benefit of their workers is quite admirable. This maintains not

only the efficiency of the working stream, but also enhances the welfare and safety of the workers as well. For example, they have installed wind turbine ventilators in all their manufacturing locations to help improve ventilation and to remove hot air for improved work place comfort.

Industrial Clothing Ltd endeavors to reduce wastage in the manufacturing process. They use excess heat from their thermal heaters to chill water. Furthermore they have plans to adopt new technologies to improve the manufacturing process and completely shift to solar power in the future.

As an industrial consolidation operating in Sri Lanka for 35 years, Industrial Clothing Ltd believes in a purpose that goes beyond mere business goals. “The owners of the company might be foreigners, but we are hundred percent Sri Lankan”, they say.

“Never doubt that a small group of thoughtfully committed citizens can change the world. Indeed, it’s the only thing that ever has” said Margaret Mead. Industrial Clothing Ltd believes it is their responsibility to be pioneers who are willing to make a difference and build a beautiful Sri Lanka.





Mr. G Ajith Weerasundara
Director Waste Management
Central Environmental Authority

Implementing hazardous waste management regulations in Sri Lanka

Hazardous waste is any solid, liquid or gaseous form of waste material that may pose substantial hazards to human health and the environment, if not properly treated, stored, transported, recovered, disposed of or managed. It may be explosive, flammable, oxidising, poisonous, infectious, radioactive, corrosive and/or toxic or ecotoxic. Hazardous waste cannot be handled by routine waste management methods because of its biological, chemical or physical properties. Apparently, every country all over the world has had problems with managing hazardous waste.



Hazardous waste is a growing problem in Sri Lanka and various factors serve to aggravate the issue. Apart from industrial hazardous waste, including clinical waste, this country is now confronted with electronic waste. According to the studies carried out by the Metropolitan Environmental Improvement Programme in collaboration with the Central Environmental Authority in 2003, it was found that around 50,000 tons of hazardous waste was generated in this country annually. Data and information are currently not available to estimate the amount of hazardous waste being generated at present. However, it can be roughly estimated that this country generates more than 80,000 metric tons of hazardous waste annually. This waste is being mixed with other solid waste and dumped in an uncontrolled and ad-hoc manner, creating threats to the environment and to human health. Hazardous waste management is a fairly new field to this country and was introduced in the 1990s.

management for the protection of human health and the environment, and for the sustainable development of the country. In this country there are a few regulations with respect to hazardous waste management. As per the provisions of National Environmental Act No 47 of 1980, those regulations were published under the gazette notification No 1534/18 on 01.02.2008 as National Environmental (Protection & Quality) regulations No. 01 of 2008. According to Part II of the regulation, "No person shall generate, collect, transport, store, recover, recycle or dispose of waste or establish any site or facility for the disposal of any waste specified in Schedule V111 except under the authority of a license issued by the authority and in accordance with such standards and other criteria as may be specified by the authority". Schedule VIII consists of two parts of scheduled wastes: scheduled waste from non-specific sources and scheduled waste from specific sources.

Environmentally sound management of hazardous waste is a vital requirement which should complement other aspects of environmental

However, due to a number of practical problems such as the lack of facilities for identification and classification of waste and, more importantly, the

absence of comprehensive and environmentally sound final disposal facilities, those regulations are not fully implemented. Even though the regulations are in place, industrialists, officers of the relevant public institutions, and the general public have very little awareness of the regulatory aspects and technical know-how of hazardous waste management. Therefore, this is the time to make the citizens of the country, including industrialists, private and public officers, and the general public, aware of the concepts, practices, and regulations concerning Hazardous Waste Management. In Sri Lanka, the present government is pushing for rapid development in industrial sector. Therefore it is essential that the industrial sector is equipped with the necessary tools to ensure sustainable development. The government has shown that this is indeed a priority with several new initiatives being proposed, including the introduction of laws and new environmental management policies and strategies.

Being a signatory to the Basel Convention for the Trans-boundary Movement of Hazardous waste, Sri Lanka has taken some vital action in line with the obligation of the convention that all signatory countries should develop and implement necessary legal provisions for the proper management of hazardous waste. Hazardous Waste Management has already been emphasised in national environmental policy and strategies. The Central Environmental Authority, as the regulatory arm for environmental management and protection, always pays keen attention to precautionary measures in order to reduce environmental pollution. Apart from the regulatory role, the Central Environmental Authority has taken several initiatives to facilitate these waste management practices.

In line with this, the Central Environmental Authority has already published guidelines on the Management of Hazardous Waste in order to provide comprehensive guidance to industrialists. In addition to the existing Environmental License

Procedure, a load based system will be introduced in the near future for industrial discharges. As a result of introducing such a scheme, industries will pay more attention to pollution prevention strategies such as Cleaner Production.

In order to provide a viable solution at national level for the emerging environmental issue of Electronic waste, the Central Environmental authority has entered into a Memorandum of Understanding with private and public sector companies to establish an island wide network to collect e-waste and channel it to a proper management system. Under this partnership program, some companies have already adopted Extended Producer Responsibility on a voluntary basis. Government laws and regulations alone cannot achieve the expected sustainability, without the active support of the industrial sector. It is the responsibility of every industrialist in the country to implement resource management strategies to minimize waste and emissions and aim for zero waste and zero emissions by applying resource efficient, cleaner production technologies. This will definitely contribute towards minimizing environmental damage.



Ms. L. Mangalika
 Director - National Solid Waste Management Support Center
 Ministry Of Local Government and Provincial Council

The role of NSWMSC in the reduction of waste issues in local authorities to make Sri Lanka a waste free place

Municipal Solid Waste Management (MSWM) has been recognized as a mandatory function of Local Authorities (LAs) by the governing legislations in Sri Lanka. In such a situation, it has become a significant challenge for the Local Authorities of Sri Lanka to provide effective and efficient municipal solid waste management services while safeguarding human well-being and environmental sustainability. As yet, the country's MSWM systems have not attained an optimum standard. Therefore it is necessary for all civil society stakeholders to pay more attention to enhancing the existing system of Solid Waste Management (SWM) for the sake of better living conditions for the citizens of their localities. To fulfill the above task, the will and commitment of various levels of government is highly essential. At the same time, the active involvement and commitment of commercial and industrial ventures as well as other institutions functioning in each locality is also a crucial factor.

Understanding the gravity of the problem, NSWMSC has been established by the Ministry of Local Government and Provincial Councils (MLGPC) to provide policy support and technical and financial assistance to develop an enabling environment for effective and efficient waste management in Sri Lanka. These interventions made by MLGPC have delivered the goods to produce successful results during the last decade. The issues and challenges encountered by our Local Authorities during that period could be described as below:

The Local Government System comprises 335 local institutions in which there are three types of Local Authorities such as Municipal Councils (23), Urban Councils (41) and Pradeshiya Sabah (271). The solid waste management of the area of jurisdiction has become their mandatory responsibility by their governing legislations. However, the past practices

reveal that the expected levels of institutional performance have not been achieved, mainly due to the lack of political will and commitment of the particular councils. Secondly, it can be observed that those Local Authorities function without a proper institutional arrangement to handle the waste generated within their localities. They have not found viable and effective mechanisms, methodologies and processes.

The next issue is that some Local Authorities have not been properly empowered with a sufficient statutory background to manage the existing challenges in SWM in their areas. It has also been revealed that most of the LAs in the country, have not passed their By-Laws relating to SWM and are also very weak even in regulating and enforcing the existing laws. Further, the assistance and support received from the provincial government has also not been sufficient. Long delays have been recorded in obtaining approval for council By-Laws submitted by the Local Councils to the Provincial Councils. As a solution, NSWMSC, along with the MLGPC, made an initial draft for a Standard By-Law on SWM and sent it to the provincial councils to be passed as the standard By-Law of their provinces.

It has also been noted that the absence of a proper planning system within the environment and health management of the area hinders the benefits of the efforts taken for SWM.

Local authorities are encountering difficulties to manage the volume of waste generated within the area effectively and efficiently, mainly due to low technical capacity and lack of experience with new technologies. Consequently, the operational feasibility of implementing the latest technologies is significantly low due to the lack of competent operational staff. Therefore new technological

initiatives and interventions are resisted and generally rejected.

The lack of suitable disposal sites is a burning issue for the local authorities. This leads to the unauthorized filling of lands, mainly abandoned marshy land in the area, resulting in environmental and social issues and litigations by members of the public and by environmental NGOs. There have been several



court rulings against Local Authorities preventing them from dumping solid waste on environmentally and socially sensitive lands, which has put pressure on central and provincial governments to carefully identify and acquire suitable land for solid waste disposal.

The civil society of the area has not reached the expected levels of discipline and commitment with improvements in social value, ethics and social responsibility. The system of SWM has become fairly ineffective mainly due to the lack of public corporation, competence and commitment. The LAs have not given priority to organizing SWM with the cooperation of organizations, the community, and other partners. It has been proven that civil society organizations, business organizations and commercial organizations are very influential institutions which could be mobilized successfully for better management of Solid Waste. There is ample space remaining to develop the institutional capacity of each locality. So another main and critical shortcoming encountered was a lack of interaction and linkage building among the relevant stakeholders and partners.

Private-Public Partnerships is another area lacking in the management of solid waste in the local

authorities. Although the private sector can play an important role in the MSWM, their involvement is comparatively low in most jurisdictions of Local Authorities.

In the five years since the inception of NSWMSC, it has recorded numerous successes by launching a



number of solid waste management programs in collaboration with other stakeholders to overcome many issues and challenges faced by Local Governments. But still there are more problems such as appropriate discharge, collection and storage which are still unresolved, and which still affect the living conditions and well-being of the citizens. Thus, the protection of human health and the preservation of the environment should still be the number one priority and obligation which should be achieved by mobilizing the attention and commitment of all stakeholders.



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 Director
 National Authority for the Implementation of Chemical Weapons Convention

Implementation of the Chemical Weapons Convention for safety and security in transporting hazardous chemicals

Introduction

The safe storage and transportation of hazardous chemicals is an essential part of any environmental, health, and safety program. Chemical transport and storage facilities must meet certain minimum standards to satisfy diverse regulations. People at work may encounter a wide range of substances capable of damaging their health. Many workers are exposed to various hazardous chemicals during production, storage, handling and transportation of goods.

Chemical accidents can occur due to technical break downs, human error, or the lack of appropriate safety measures. A series of uncontrolled chemical phenomena such as runaway chemical reactions, large spills, fires and explosions may be initiated by such accidents. These phenomena affect both humans and non-humans in the form of both immediate and residual or long term consequences. Thus, it is imperative that preventive measures like safer engineering practices, improved safety devices, proper placard systems to identify hazardous chemicals, and regular checks that eliminate human errors be developed.

In recent years, as a result of various accidents/incidents, a large amount of chemicals have been released into the environment. The oil spill in the Gulf of Mexico, the releasing of toxic waste into the Danube River in Hungary, and toxic waste being released into the Beijiang River in southern China are recent examples of ecological catastrophes produced by toxic chemicals.

Due to rapid industrialization, many chemical based accidents/incidents have taken place in Sri Lanka on many occasions. The releasing of chlorine and phosgene from a container stored at the Colombo port terminal, the explosion of a container containing hydrogen peroxide at a container storage facility in Colombo, and the explosive chemical blast at the explosive storage facility in the Eastern Part of Sri Lanka are the main incidents that happened in the period of 2009-2010.

In general, chemical industries in Sri Lanka show two particular areas of weakness. Namely, chemical safety and hygiene, and hazardous waste disposal. In these two areas, policies and procedures are weak or nonexistent, and enforcement of these policies is extremely difficult. The stringent procedures that are applied in developed countries are too expensive for direct implementation in Sri Lanka, yet solutions appropriate to the country's needs and capabilities are necessary in order to minimize serious environmental problems.

Transportation of Hazardous Waste

The transportation of hazardous waste in laboratory buildings and on the road provides the greatest potential for chemical exposure. Spills occurring outside store rooms and laboratories may lead to hazardous concentrations of vapors and gases being distributed throughout the building.

Whenever dangerous goods are transported, certain measures should be taken to ensure that the potential risks are adequately communicated to all who may come into contact with the goods. This can be accomplished through marking and labeling the packages to indicate the risks of the consignment, through including relevant information in the transport documents, and by placing placards on the containers and vehicles being used.

Many transport vehicles and containers do not display proper placards and labels about what they are carrying inside the container. To prevent any accident/incidents, it is always advisable to follow certain regulations.

- Chemical substances and research materials must be clearly labeled with appropriate symbols and with the correct chemical name when transported.
- Carts used for chemical transport must have sides, on each shelf, that are high enough to retain the containers. Cart wheels must be large enough to prevent the carts being caught in floor cracks and door and elevator thresholds.

- Personnel transporting chemicals must (at a minimum) wear chemical resistant gloves and safety glasses.

Each package should be marked with the appropriate shipping name, hazard class (Placard) and UN number, followed by the packing group reference.

Role of the National Authority for Chemical Weapons Convention on Hazardous Chemical Management

The National Authority for Chemical Weapons Convention (NACWC) plays a critical role as a monitoring body to ensure that transportation security and safety measures for hazardous chemicals are met.

Detailed instructions on how dangerous goods should be classified and packed are given in international agreements and national provisions.

- Labels should be placed on containers and vehicles so that they are clearly visible.
- While transporting dangerous goods, all packages should carry appropriate warning labels based on the classification of dangerous goods.
- Only one danger class label (placard) should normally be fixed on a package. However, if the substance or article presents more than one significant risk, such as fire and poisoning, the package should bear labels indicating important subsidiary risks.

Safety measures should include organizational, personnel and engineering aspects, and co-operation between operational staff during the transport should be emphasized.

In recent years, the National Authority for the Implementation of Chemical Weapons Convention (NACWC) under the Ministry of Industry and Commerce has conducted a series of training workshops to train response specialists who deal with chemical emergencies/ hazardous waste accidents in Sri Lanka. Professionals from the tri forces, the medical field, universities, the government analyst department, and the police and fire service department were trained in collaboration with Organization for the Prohibition of Chemical Weapons (OPCW).

All together 42 response specialists have been trained and dispatched for chemical disaster management

and mitigation purposes. This brings new insight into hazardous chemical management in Sri Lanka with the concepts to develop an accident free environment in the country.

Training of Response Specialists dealing with Hazardous Chemical Management, Colombo, Sri Lanka 10-18 June, 2012



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Professor Ajith de Alwis
 Project Director, Office of Science Technology & Innovation, Coordination Secretariat of STI
 Professor of Chemical & Process Engineering at University of Moratuwa

Realising Clean Cities: We need discipline and a technology mindset!

It is no secret that whenever we view a cityscape in a developed country, from Vancouver to Berlin or Rome to Brisbane, the view is uniform. Cleanliness and orderliness is evident and people appear to dispose of their waste in a uniform manner. As an academic interested in waste management, when you dig deeper into each city's provisions for maintaining that outlook, you see that there is a structured approach to waste management. That structure is fully supported by the city's inhabitants too. Of course this did not materialize in a day.

Even immigrants, whatever their age or country of origin, quickly adopt the procedures quite willingly, even though errant behavior such throwing litter out of the car in order to selfishly keep the interior of the car clean may have been the norm in their home country. There is a role for the media to play, as was done in these countries, to guide the public and inculcate good practices. Just paying glowing tributes to other countries is not what is needed in our own press.



Fig: There is a need to drive citizens towards better practices.



Fig: Colombo still needs the final processing and management step for solid waste.

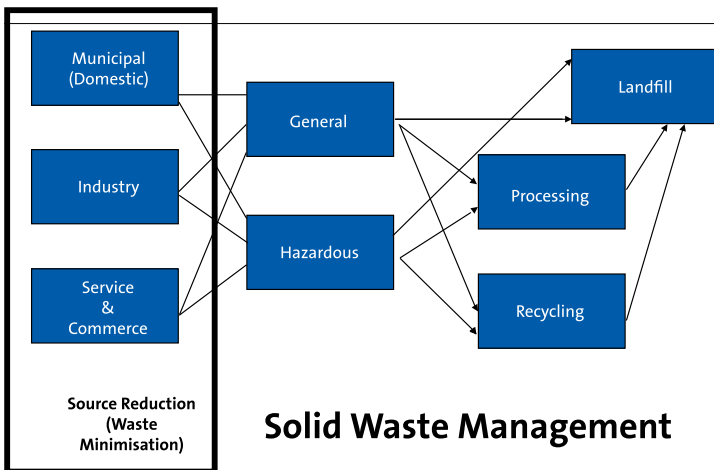


Fig: If all cities practice this, it will result in clean cities. The first step by citizens is important.

We know that in Singapore, a small city state, if you do something like that you will have to wear a placard and be subjected to a public works order. In addition, you are sure to hit the news stream with full details. There the discipline is kept with a strong rule-based system and the enforcement is not negotiable! Children grow up in that system knowing full well what they can or cannot do. The same is true in other developed cities though the public works orders are less present.



Fig: Singapore's Corrective Work Order system for polluters

There is no question that we too aspire to have clean cities. The Colombo of today is quite different to what it was even a few years ago. The transformation is still going on. The greater cleanliness is evident and

that is one aspect that strikes the traveler. However, if you travel into all corners and cut across certain areas, you may witness collected garbage dumps minus even a soil cover. We are yet to close the loop as far as the integrated solid waste management concept goes. The generators need to be much more disciplined and civic minded. You cannot just expect someone else to be totally responsible for your garbage. There is still little support for Sri Lanka's adopted process of 3R - reduce, reuse recycle. At the domestic level, the place to start and to learn, good practices are not quite visible. Cleanliness is sought, but there is no full engagement with the process. Hence all collected material, be it general or hazardous, will likely travel across to a single disposal point through both formal and informal channels. Lampposts serve as repositories for waste collectors. In cities of developed countries, recycling centres or collection points are visible and you may observe that these places are visited both by children and adults. These are still conspicuously missing in Colombo and elsewhere, except for a few places where the Sampath Piyasa concept operates through local council efforts.



Fig: People have easy access to waste disposal points where segregation is upto the citizen

It is important to understand that moving waste to a dump does not solve the environmental pollution issue and is not an effective way to manage a city's waste. Management is complete only when the final disposal is technically correct, socially acceptable, and economically viable. The fact that waste is a resource is not forgotten in the integrated waste management concept. The value is recovered in various ways. The organic portion of the waste has to be well managed too as this fraction can cause major issues if mishandled and allowed to rot in the confines of an open dump.





Fig: Recycling Points and Centres are quite common in 'clean cities'



Fig: Biogas fuelled train in Sweden (Biogas is generated from liquid and solid waste)

The recovery of wealth from waste needs to be systematically planned and executed. The recycling infrastructure needs technical planning. The technology to manage various solid waste fractions too needs selection, sizing and implementation. When the waste is wet, as it usually is in Sri Lanka, the methods followed in western countries will not be appropriate. Some countries such as Singapore have followed certain systems from the beginning and as a result have an accumulated wealth of knowledge about that particular process. As the economy has changed, the nature of waste has also changed in Singapore and this is likely to happen in Sri Lanka too. It is for this reason that countries such as USA periodically carry out waste profiles across states. The waste one generates gives a personalized signature and this is applicable to a region or a country too. Purely considering financial aspects is unlikely to deliver the right solution, and Sri Lanka should understand these important nuances with respect to solid waste management. A brief analysis of projects for Colombo over the years are quite revealing, yet the same errors are continually being repeated. For example, the train in the picture included is supported by solid waste. It is no secret that in Sri Lanka we spend on fuel and fertilizer and an option such as biogas from organic waste can serve quite well in this regard. This is where the technical mindset should come in. All thinking in rupees and cents will not make much sense!

Colombo) where there are models for recycling and composting etc. and children can come out with a greater understanding.

While we make significant progress in the City of Colombo, we must also demonstrate via integrated solid waste management that the City of Colombo is clean and sustainable! The model is repetitive and the process is transferable to the suburbs!

There is much to be learnt from elsewhere, though certain sustainability related steps could be uniquely ours. There is the need to educate children and the youth and it is instructive when one visits a science centre in a city (another missing element in



Sajith Edirisooriya
Finance and Controlling Manager - Geocycle
Holcim (Lanka) Ltd.

The Bottom Line: Green Bank

From its inception in 2003, Geocycle has been a pioneer for responsible and scientific waste management in Sri Lanka, providing its clients with effective waste management solutions for industrial waste. However, as the waste management arm of Holcim (Lanka) Limited, Geocycle felt the need to spread the message of sustainable waste management on an individual level as well, particularly within Holcim, its own workplace and household. Therefore, Geocycle came up with the concept of 'Green Bank', which aims to provide a convenient and attractive means of disposing of household and office waste, thereby reinforcing eco-friendly habits among Holcim employees, their families, and, in future, other selected organizations.

Considering the definition of a bank, which means depository and payout with an interest model, the project launched to inculcate sustainable waste management practices into Holcim employees' lives is named "Green Bank". For Green Bank, the deposits are household and office waste items such as paper, cardboard, plastic bottles, polythene, and electronic items. Collection points have been set up in two locations considering the convenience of the employees and collection takes place twice a week. These collection stations are manned by employees who are put on a roster. Collected waste is weighed and points are awarded (per kilo) to the depositor on the following basis: 5 points for paper, 3 points for polythene, 2 points for other waste. Points are not awarded for electronic waste since it cannot be recycled or reused. Members' points are maintained on an electronic pass book and accumulated points can be redeemed to obtain rewards. The rewards are strictly eco-friendly products such as products made out of recycled materials. In addition to rewarding individual members, the department or unit with the highest monthly contribution also receives a special gift. The waste that has been collected is selectively sent to be recycled, turned into compost, or disposed of, and the income generated from such is used to fund the rewards scheme.

There are a number of benefits from the Green Bank scheme. Firstly, members and their families have a safe and reliable method of disposing of waste, and they get rewarded for it too! More importantly, members will learn and cultivate important eco-friendly practices both in the office and at home, such as the proper segregation of waste and being alert to saving paper, water, and electricity. This will reinforce the 5R concept of sustainability: reduce, reuse, recycle, reinvent, and replace. Within the first three months of operation, more than half the employees at the Holcim Head Office became members of Green Bank, and employees from all departments assist with the logistics, so Geocycle is confident that this program will have its intended effect.

Green Bank is a project that strives to be eco-friendly in every possible way. For instance, the Green Bank team is mindful of using electronic passbooks and email updates and reminders in order to save paper. As mentioned before, all the rewards available to members are eco-friendly products. In addition, the handmade items are sourced from rural, poverty-stricken communities so that there is an additional benefit of lending a hand to cottage industries. Therefore Green Bank is a model which strives to achieve the triple bottom-line.

The Green Bank project goes beyond the confines of the Holcim Head Office, however. The Green Bank system will start functioning in the Puttalam and Ruhuna Holcim plants within the next few months. In addition, Geocycle has already launched Green Bank at the Swiss Development Council, and intends to extend this service to other non-profit organizations. Talks are currently underway with UN offices and with universities to implement this program at those locations as well. Geocycle will assist such organizations with the setting up of collection points and with the recycling and rewarding procedures and is even looking into the possibility of introducing Green Bank to schools, in order to make a lasting impact with this project.



Prof. B. F. A. Basnayake
Professor Energy & Waste Management
University of Peradeniya

Moving from dumpsites to sustainable landfills: Option of waste to energy

Project development

The increase in waste generation is a burden on society, not only in Sri Lanka but all over the world. Local and central government authorities rely on developing appropriate policies, economic instruments, and appropriate methods or technologies to provide solutions to both minimize waste generation and dispose of waste safely. Whether the best methods or technologies are selected depends largely on the capacity and capability of the local authorities. Moreover, the local authorities (LAs) need to develop an effective economic framework to minimize, collect, transport and dispose of waste in a sustainable manner. One of the options for the LAs is to develop sound public-private partnerships to overcome political, social, fiscal and technical constraints. These limitations can only be resolved to a great extent with project appraisal and development. This allows LAs and enterprises to make the most prudent decisions to move towards sustainable solutions.

R&D and human resource capacity building

Such a concept was arrived at with the experience gained from the project of rehabilitating the Gohagoda dumpsite and establishing an integrated solid waste management system for the Kandy Municipal Council (KMC). At the outset of the project, only technical solutions guided the project, since the Council was satisfied with the outcomes of the sub-project “Sustainable Solid Waste Landfill Management in Asia” of the project Asian Regional Research Program on Environmental Technologies (ARRPET). The two phases of the project were funded by the Swedish International Development Agency (SIDA) and coordinated by the Asian Institute of Technology (AIT). The University of Peradeniya played a key role in developing a number of technologies, from landfill pretreatment to landfill bioreactors (LBR), with the collaboration of AIT, Anna University in India, Kasasart University in Thailand

and Tongji University in China. Unfortunately, the third phase of the project did not materialize due to the irresolute outcome of the Copenhagen Summit in 2009. By then, a fair number of students had been trained and had become experts in solid waste management. It became a challenge for most of us to ensure that the findings were put to good use in the march towards sustainable solutions.



Biochar Plant

Need for rehabilitation of dumpsite

Alternative sites for the establishment of a waste to energy system were evaluated. The cost of transport, NIMBY syndrome and, most of all, taking responsibility for the rehabilitation of the existing dumpsite, became apparent obstacles to moving away from Gohagoda. The rehabilitation component turned out to be the most challenging task. None of the enterprises invited to join hands with the UoP to implement the project were willing to rehabilitate the dump and relocate the houses. One of them was a director of a Korean company. He said that his company almost went bankrupt trying to treat leachate and that without a tipping fee, it would be suicidal. Nonetheless, the UoP team went back to the drawing board to find a low cost solution for treating leachate oozing out from the dumpsite. The patented technology of the liner system used

for the landfill bioreactor provided the solution. A Leachate Treatment Bioreactor (LTB) was conceived and established once the EIA approval was obtained. The same liner was used in constructing an activated sludge process, algal pond and constructed wetland. Many setbacks were forced on the company Ecotech Lanka Ltd., which was established to undertake these tasks. To most investors, it appeared that the vision and mission of the company were obscure due to a lack of experience and know-how on their part. Numerous companies agreed to be partners and commenced activities, but left as soon as they realized the gravity of the problem, leaving Ecotech to carry out this arduous rehabilitation effort of installing an interceptor pipe network and establishing the leachate treatment.



Biochar Plant at Operation

Valuation of dump and products

However, the company has attained 75% of the leachate management and is ready to supply Biochar and Refuse or Residual Derived Fuel (RDF). Biochar production is supported by many leading banks and companies who now know the value of the commodity. Biochar is the only commodity to bring about sustainable agricultural production in tropical soils. The research conducted with the collaboration of the UoP and other companies points towards biochar or torrefied RDF as a better solution for organic waste markets than reliance on pathogen laden compost made in piles from MSW. Better still, Life Cycle Assessment (LCA) on plastics shows thermal conversion to energy and power as best practices, since recycling becomes a burden on the environment if the tonnage increases beyond the carrying capacity due to transportation pollution, costs and reduction of petroleum by product usage. RDF fuel manufactured from biodegradables and

plastics can be made equivalent to coal. This could be used on-site or off-site elsewhere. All these different combinations of technologies and attempts to establish sturdy management of the dumpsite and incoming raw waste led to repeated negotiations with banks and several other leading companies. Since leachate management became a near reality, the Resource Utility Value principle was applied to develop the feasibilities needed for materialization of stage-wise development of the project.

Income generation and social responsibility

The RDF and biochar are now providing the means of income generation while the dual fuel power plant will be operational in the very near future. Fuel derived from gas from landfill bioreactors and RDF from mining of dumpsites, or, eventually, the LBR, is a novel approach. The estimated time to mine the dumpsite is seven years. This will eliminate the burden on the KMC and on future generations. Investor confidence was lacking at the beginning and now the project developers are seeking avenues to penetrate the Asian scenario. One of the most beneficial outcomes will be the social enhancement of communities living within the site and in the surrounding neighborhood. Rag pickers will become dignified workers in the Material Recovery Facility and RDF manufacturing plant. The relocation of houses far away from the dumpsite is, with or without the project, a social responsibility. Besides, hazardous waste management is a serious concern and an issue. It is hoped that Geocycle will help in this regard. All of these experiences will add value to university curricula on waste management.



Leachate Treatment Bioreactor



Eng. V R Sena Peiris
 Director, National Cleaner Production Centre, Sri Lanka
 President, Asia Pacific Roundtable on Sustainable Consumption and Production

The challenge of the new generation- sustainable consumption & production

The over exploitation of natural resources due to population explosion, urbanization and changing life style is a common problem across the globe. The ecological foot print of individuals in most parts of the world exceeds their fair share. This indicates that we are heading towards disaster due to environmental problems emerging as a result of the over consumption of resources. The resulting environmental problems appear in the form of natural calamities, health related issues, a dearth of resources etc. It is surprising and sad that less than 20% of the global population is living in abundance while the majority lives in the midst of shortages.

The Asia-Pacific region represents a specific segment of the global population with special identities. The region is rich in natural resources, but a majority of the world's poor lives in this region. Extremely rich and extremely poor people coexist in this region, especially in developing countries. In addition, a number of tribes and nations having centuries old cultures and civilizations live in the region.

Though Sustainable Consumption and Production is a phrase coined recently, we can retrace our foot steps back to the past to learn from these old civilizations about the sustainable coexistence of human beings with the environment. Most of these old cultures had a number of sustainable practices, which we can adopt today to suit our changing needs. If we carefully analyze the practices of our ancestors, we can find modern concepts like Cleaner Production and Life Cycle Thinking embedded in all their practices.

Individuals alone cannot achieve sustainable consumption and production. While each one's life style can make a very small contribution, entire countries and nations have to recognize this fact and develop their national economic plans with this ultimate objective in mind. The journey towards sustainable consumption & production necessitates the combined efforts of international organizations, donors, national governments and people. Pulling

in different directions to fulfill individual goals & objectives is going to make the situation worse.

We have to recognize the fact that poverty is a pressing problem and the poor demand more resources to meet their basic needs. The scarcity of limited resources places a premium price on goods and services and this tends to widen the gap between the rich and the poor. Low quality goods with short life spans fill the gap to satiate the needs of the poor. These products consume a large amount of non-renewable natural resources and are designed without any consideration to their life cycle. The national and sub national economic policies should address these aspects for the nation to journey towards sustainable consumption & production.

Theoretically, reaching goals of sustainable development is easy, but in practice it is a gigantic task. A plan developed by a group of planners sitting in an air-conditioned office cannot meet the aspirations of the global population. Every body knows that the world population is increasing rapidly and it is estimated that it will exceed 9 billion by 2050. Each and every human being born on the earth expects to meet his development needs at the expense of others. Only a minority will think of other living beings and the plant life, allowing them to fulfill their needs from the very same resource base.

Meeting the needs of every human being without due consideration to natural ecological systems can bring disaster to humans and to the environment. Paying lip service to the protection of the environment and bio diversity does not help either mankind or the others living species. It is important that every person understands the fragility of the ecological system in relation to the impact caused by him. Today, life on earth is in grave danger, not because of the actions of any other species, but because of the actions of man himself. It is true that cosmic actions too play a role in the changes on the earth, but the over consumption of resources is considered to be the main contributing factor for the degradation of living systems.

The over consumption of resources is one side of the coin. The generation of waste through production and consumption, and its improper disposal is the other side. The earth serves as a sink for the disposal of waste generated by all living species. Other than humans, all other species dispose of only their excreta and dead carcasses in this huge sink and the earth has its own mechanisms to assimilate this waste within a short period and convert it into other useful resources. This was the case even with humans before the industrial revolution in Europe changed this scenario. While the discovery of coal spurred the industrial revolution, the finding of liquid petroleum at the turn of the twentieth century accelerated modern technological and economic development.

The petroleum based technological revolution made humans turn to materialism. As a result, the resource requirement of each individual has grown manifold. This in turn has increased the quantity of waste generated, causing the sink to overflow. Today, the natural ecological balance has been disturbed and earth cannot digest and renew the waste received by it within a reasonable amount of time. The accumulation of waste has placed severe stresses on the air, water, and the soil, which serve as the media for transporting these waste streams.

To make matters worse, scientists have invented many new chemicals, which are useful to humans for improving their life style, but which cause great dangers to the eco system. Current environmental problems such as ozone depletion, climate change, acid rain, as well as the degradation of water quality and soil condition, are direct results of the excessive quantity of waste and its hazardousness. The combined negative impact of these problems and other sources of pollution are instrumental in the disappearance of many living species, the increase of health hazards, food insecurity, water scarcity and a plethora of other threats to human life.

Over the last four decades many have tried a multitude of solutions to combat the negative impact of excess waste and have found that nothing works better than reducing the total amount of waste discharged. How can one reduce the waste discharged? The only way is by changing current patterns of production and consumption. This change will lead to the sustainability of the earth and the eco system and we define this change as

sustainable consumption and production.

However, human needs have become multiple and complex, mainly to satisfy their ever increasing demand for products and services. In the past people ate a meal to satisfy their hunger. Today a meal is not only for satisfying hunger. Instead it represents social status, comfort, convenience, as well as access to wealth. Many have moved from home cooked meals to restaurants as a business strategy. Many believe that mingling with the society at restaurants gives them a business advantage. The associated health costs, social rifts and environmental impact of this bloated life style has not been fully evaluated by any researcher so far.

In the ancient past our ancestors preserved excess food using very simple, energy efficient, non-chemical techniques and technologies that were very environmentally friendly. Today also we preserve our food, but the purpose and the methods of preservation have changed. The busy lifestyle of modern day humans does not permit spending a lot of time preparing food for consumption. Therefore many have resorted to consuming preprocessed and packaged food, which is termed instant food. Most of these processed food needs to be stored under refrigerated conditions, thus making it energy dependent. The processing is mostly done using chemicals and artificial ingredients.

Every facet of the modern lifestyle of many urban human populations is similar to food consumption. It is artificial, energy and resource dependent and complex. This is no different in our country as well. Not only the rich, but the middle class urban population is also victim to this vicious life style. Little do they realize that their consumption-oriented life style is not sustainable in the long run as it imposes severe stress on the environment. The environment patiently absorbs all that we discharge as waste, but the natural reactions taking place due to excessive waste generations hit not only the consumers but also all human beings as well as all living beings. Catastrophes such as acid rain, global warming, floods and water stress are just signs of the full-scale catastrophes we are going to experience in the near future. However developed we are scientifically and technologically, we have been unable to develop effective means to combat these catastrophes when they hit us.

Certainly we cannot undo the damage that we have already done. The generations living in the next two or three centuries will have to face the environmental effects of our actions. Still, it is not too late for us to delay and mitigate these future effects if we act wisely. What are the things that we can do?

First of all we have to understand the situation that we are in. The excessive exploitation of natural resources on one side, and the excessive production of waste on the other, are the major reasons for these future catastrophes. The population explosion and our extravagant life style are the reasons why we extract more resources and produce more waste. No government can stop the population explosion in the short term. Appropriate strategies and incentives are necessary elements of a population control policy. The government has to obtain the support of other organizations and of individuals to formulate strategies and incentives. We have to remember that poverty and illiteracy are key factors for population increase. Therefore, the wise management of child and adult education can lead people from the trap of poverty and illiteracy.

Sometimes the wrong application of education leads to more consumption. The conventional education systems associate success with increased consumption. However, removing this mentality must also be achieved through education. This necessitates innovative approaches by educational policy makers to combine the principles associated with sustainability with conventional job oriented education.

Changing the life patterns of people is the most difficult task. Modern day communication channels and their misuse by marketing and advertising personnel have made this doubly difficult. Rules, regulations and policies alone cannot change life patterns. The educated have spend more on consumption, and whenever the have-nots progress to have they move from less consumption to more consumption.

Latent human values which have been ignored in the midst of materialistic consumption-oriented

development need to be given a new thrust if we want to change life patterns into more sustainable lifestyles. Merely copying the solutions of the past cannot solve modern day problems. The sustainability principles of the past are still valid, but the methods may not be applicable today. So we have to mix these principles with action appropriate to the modern world if we want to progress towards sustainability.

This brings us to another dimension: the concept of satiability. The achievement of sustainability becomes a reality only if productivity and satiability are fully realized. The current approach of resource conservation and waste minimization at an individual level will be inadequate to protect the world from impending disaster. Satiability of individuals as well as of the society is essential if we want to ensure the future survival of the world.

In very simple terms, satiability means being satisfied with the state of affairs. For example, why do people use private vehicles to meet their mobility needs? The reason is that they cannot depend on public transport systems to meet their needs adequately and in a timely manner. When the basic premise of satiability cannot be met by an existing system, humans try to find alternatives which fulfill this basic premise. Urbanization makes it easy to introduce novel techniques and technologies to enhance satiability without exploiting natural resources.

According to sustainable consumption and production principles, we have to reduce resource intensity of products and recover resources from post consumer goods. Eco Efficiency strategies can be used to achieve these goals. Products need to be redesigned in order to eliminate the use of non-renewable resources, including fossil fuels.

None of these will be effective unless we change our consumption patterns using smart consumption strategies. The change will come only when we understand that our quality of life is not dependant on using more and more resources. National policies should drive our economic systems to decouple our wellbeing from consumption. Only then will we be able to travel along the path of Sustainable Development to achieve equitable development both for ourselves and for our progeny.



Mr.Chathura Welivitiya
Managing Director
HELPO Eco Green Ltd

The role of biogas technology for a sustainable and profitable solution to the waste problem

Urban waste poses a major environmental problem in Sri Lanka due to the lack of technical expertise, a regulatory setup, and adequate funds within urban local bodies to develop an efficient waste management strategy. Biogas production and utilization as a renewable energy source has immense potential for growth in Sri Lanka, especially in view of its overall environmental benefits of reduction in waste, green house gas emissions and environmental pollution. This, however, depends on the availability of appropriate technologies and expertise for setting up commercially viable biogas plants. Numbers of companies are currently in a position to fill this knowledge gap and develop business opportunities while contributing to environmental solutions in Sri Lanka.

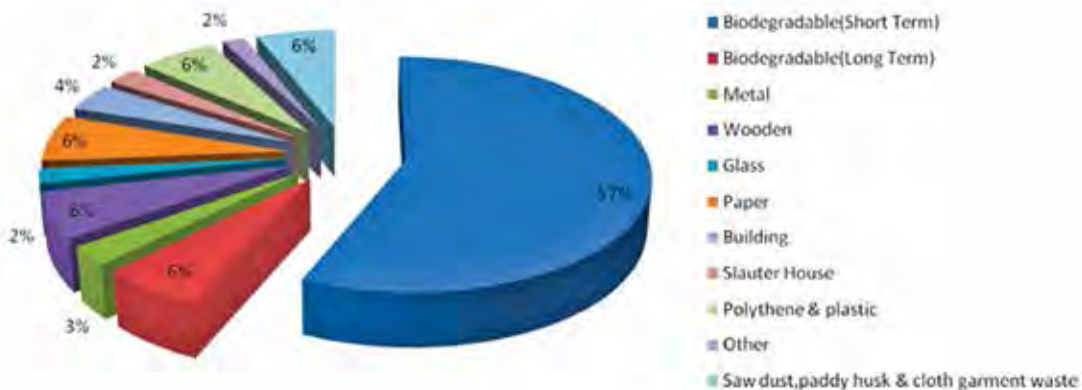
HELPO Eco Green Ltd biogas technology makes it possible to create green energy from human excreta & waste water. This technology is being implemented at a domestic level and at a community level in factories, hospitals, hotels, market places,

prisons, religious places, schools, forces camps, service centers & local authorities.

When we consider the waste composition of Sri Lanka, a large portion of waste is categorized as short term biodegradable waste. It means that there will be no difficulty in waste management after segregating waste. We introduce a waste sorting system before implementing biogas technology to identify the strength of the need to put an organic waste management system in place. This method has also proven that organic waste collection is high everywhere. Therefore, HELPO Eco Green Ltd is expanding the service of providing biogas technology as a sustainable solution for organic waste management in Sri Lanka.

This mechanism provides multiple socio-economic & environmental benefits such as providing renewable energy & organic liquid fertilizer. In addition, this method reduces the emission of methane into the air through dumping waste in an irregular way.

Composition of Waste Collection in Sri Lanka



Biogas is used for cooking & lighting purposes by many biogas users. It reduces the electricity bill considerably. Biogas organic fertilizer is very effective and many biogas users use this organic fertilizer for their home gardens. Globally, HELPO Eco Green Ltd has demonstrated the benefit of biogas technology in minimizing methane emission by winning the 'Earth Care Award-2012'.



The following case study descriptions show the benefits of biogas:

Evergreen tea factory has faced many difficulties in managing their daily waste collection & our company designed a total solution package for them. It was the integration of waste management for both kitchen & toilet waste. The size of the biogas plant is 35m³ & the amount of waste reduction is 650 kg per day.

They no longer use LP gas in their kitchen as the energy source for cooking purposes, they only use biogas. The biogas plant has reduced methane emission by 8.75m³ per day.

St. Mary's Convent is a popular school in the Matara district. By constructing a biogas plant (22m³) in this school we have solved the toilet waste problem of the school. It was very difficult for them to manage the large quantity of toilet waste due to the large student population.

The biogas is used in the school hostel kitchen to prepare meals for the students three times a day. Therefore they save a large amount on per month & that saving is used for development of the school. Methane emission reduction is 5.5m³ per day.





Mr. Kushan Kodithuwakku
 Managing Director
 Orient Holdings (Pvt) Ltd.

Orange Electrical sets up South Asia's first- ever CFL recycling plant

Compact Fluorescent Lamps (CFL) are fast emerging as the worldwide standard for commercial and domestic lighting, as they can save up to 80% on electricity costs and last 8 – 15 times longer than ordinary bulbs, making them highly environmentally friendly. In fact, in Britain, there is a 'Ban the Bulb' movement, which encourages consumers to switch to CFLs. China too is encouraging the change, while the U.S. Congress has passed a law which will make the traditional light

bulb obsolete by the year 2014. Despite their obvious environmentally friendly properties, CFLs contain minute amounts of mercury, which is considered a hazardous substance. While the mercury content in a single CFL may be insignificant, the combined effect of millions of them being

improperly disposed of worldwide could cause considerable damage to the environment. In Sri Lanka alone, around 1 million CFLs are used every month. There is an added danger since mercury pollution is not merely local in its effect. Once it reaches the ocean, it can spread to the far corners of the earth.

Recognising the need for a responsible and environmentally friendly method of disposal for CFLs, Management of Orange Electric's has set up South Asia's first ever CFL and fluorescent bulb recycling plant, in collaboration with Per Kristoffersson, founder of Nordic Recycling AB of Sweden. Nordic Recycling is the market leader for recycling lamps in Scandinavia and is certified according to the quality standard SS EN ISO 9001, environmental standard 14001, and Medical Devices Directives 13485 and is approved by the Swedish Government for handling dangerous waste.

Operating under the name of "Asia Recycling (Pvt) Ltd", this joint venture has the backing of the Central Environmental Agency (CEA) of the Government of Sri Lanka. The plant, located in Homagama South Pitipana of Rideemulla, has the capacity to recycle up to 30,000,000 bulbs per annum, which is nearly three times greater than the annual CFL usage in Sri Lanka.



The company will undertake the recycling of any brand of CFLs and fluorescent tube lights currently available in Sri Lanka, thereby providing a “Solution to the Pollution” in the country and preserving the nature for many future generations. The technically advanced recycling system in this plant separates the glass from the plastic base before cleaning the glass of its mercury bearing powder coating. All parts of the lamp are treated chemically and mechanically to achieve virtually total removal of the mercury within a completely sealed machine.

In fact, this process results in a recovery rate exceeding 95%. This is well within the limits approved by environmental authorities worldwide and has absolutely no harmful effect on the environment. The recovered glass is used for the production of new glass items, the end caps are recovered as metal, and the e-waste is collected by certified e-waste collectors appointed by the CEA. The plastic parts are recycled for the production of plastic items.

Thus Orange has strengthened its significance by adopting the concept of cradle to grave for their CFL products. However, the cooperation received from the general public and other stakeholders is poor. This may inhibit the project to make recycling machines in our own recycling plant.

With the commencement of this recycling effort through Asia Recycling (Pvt) Ltd, Orange Electric has proved itself to be a good corporate citizen and the most environmentally responsible manufacturer of



CFLs in Sri Lanka. In the process, Orange Electric has elevated Sri Lanka among the international leaders in CFL recycling.

This proves to the world that Sri Lanka, despite being a relatively small country, is contributing towards a safer environment, which would have a significant impact on the future of the global village that we work and live in.





Stop the earth from bleeding

We at Orange Electric have taken the lead in reducing the harm caused to the environment by the improper disposal of CFLs. Now you too can play your part. Instead of throwing your burnt CFLs in the bin, hand them over to any Orange CFL dealer for recycling. You will also receive Rs.10 off for every Orange CFL you buy as a reward for your commitment to protecting the environment.



Orange CFL - *The greenest light on earth*

Splint & Seal





Mr. Mahendra Ariyapala
Environmental Engineer
American & Efirid (pvt) Ltd

Sustainability at A&E Lanka (Pvt) Ltd.

American & Efirid Lanka (Pvt.) Ltd., commonly known as A&E, is a fully owned subsidiary of American and Efirid LLC, USA, the world's foremost manufacturers of sewing threads and industrial yarns with a global presence in over forty one countries.

We look beyond the obvious in our journey to sustainability. A&E believes sustainability impacts, not only our own enterprise, but the entire value chain including our suppliers and customers. Therefore we adopt a structured approach to address those effects as well for the full scope of sustainability.

Our sustainability vision involves the development and implementation of goals and priorities. Our unique 'Ten Threads of Sustainability' details and meets both sustainability and business objectives. This includes the followings -

1. Global Carbon Footprint
2. Water Conservation and Recycling
3. Energy Conservation
4. Sustainable Packaging
5. Recycling and Waste Reduction
6. Sustainable Products
7. Global EHS and Social Responsibility
8. Supply Chain Sustainability
9. Eco-Driven Product Stewardship
10. Eco-Driven Education and Involvement

At A&E Lanka we recognize and understand the importance of keeping it local while being global in order to extract the full value from our corporate sustainability culture.

We had an 'Eco Driven Week' from the 24th to the 28th of September, 2012, aimed at reinforcing and sustaining our corporate sustainability culture. This campaign included not only of posters and flyers, but a series of interactive workshops and presentations, with the participation of every single staff member, because sustainability involves all of us. In order to reduce greenhouse gas emissions and to mark the world's car free day on September 22nd, we also had a 'Car Free Day at A&E' which received the whole hearted support of staff members who used public transport and other alternative means of getting to work.

At A&E we believe in giving back to the environment and our surroundings. We not only 'Go Green' but 'Grow Green'.

A&E Lanka's efforts were recognized when we were conferred the 'Environmental Excellence Award in Sustainability' for the outstanding achievement of 'Zero Landfill Waste' at the A&E Global Sustainability/EHS Conference held in the U.S.A. For years we have been committed to following a successful solid waste recycling programme and working towards eliminating the use of landfills. Therefore we are indeed proud to have achieved this historic milestone. Included in this programme is closed loop recycling; for example, the recycling of empty thread cones and the co-processing of ETP sludge with cement. We at A&E may be recognized in our continuous endeavours towards sustainability, but it is only a small step where the ultimate reward will be appreciated in the future.

A&E showcased its '10 Threads of Sustainability' in the "Green Zone" at the single largest career and educational exhibition in Sri Lanka, EXDEX, EXPO 2013, with the motive of educating youth on sustainability and its importance. During the exhibition, we selected 25 students and offered them a 3 day workshop on "ECO Driven" Lifestyle. The workshop was held at the Centre for Banking Studies, Rajagiriya, on the 6th & 7th of March, 2013, to continue our global commitment to '10 Threads of Sustainability'. On the 6th and 7th, the students had a great opportunity to meet and share knowledge with a highly experienced panel of environmentalists, chemists and high profile lecturers. On the 3rd day, two factory visits (MAS Thurulie and A&E Lanka) were organized to show how sustainability approaches are practiced in the industry. From the workshop participants, two students were selected to visit A&E's "Zero Liquid Discharge Plant" in India.



At A&E we do business for a better world; we integrate sustainability into operations, processes and across the value chain globally. Our workforce worldwide has embraced process change and is committed towards our 'Ten Threads of Sustainability' -ten paths towards global conservation.



Mr. Nalin Gunaratne
Managing Director
Green Link (Lanka) Ltd

Go green with e-waste

E-waste covers almost all types of electrical and electronic equipment (EEE) that has entered or could enter the waste stream. The amount of e-waste is growing exponentially because the market for these products is growing rapidly as many countries cross over to the other side of the 'Digital Divide'.

The lack of awareness of the hazardous effects of e-waste and the low level of knowledge on e-waste recycling among the population can be pointed out as key issues in Sri Lanka. The frequency with which e-waste is dumped improperly or reaches the hands of unauthorized parties/scrap dealers has increased. As a result, e-waste is dumped in landfills, which can lead to negative consequences for the health of humans and the environment. When burnt or dumped in landfills, this waste could release dioxins that are harmful to the human reproductive and immune systems.

Cadmium and mercury are some of the toxic substances which may accumulate in the environment, affecting the kidneys and bones of humans. This e-waste can cause further damage the nervous system, kidneys and brain, and can even be passed on to infants through breast milk.

Hence it is necessary to reduce the hazardous effects of e-waste on nature. Even though people are unaware of this situation, e-waste creates worse illnesses such as cancers, skin diseases and many other illnesses. Therefore e-waste is a very dangerous type of waste which needs to be recycled according to a special process.

Green Links Lanka accepts all types of e-waste and sends it for recycling. Among the items accepted are CRT tubes, television tubes, mobile phones, hard disks, mother boards, CPUs, and household appliances such as televisions, refrigerators and washing machines.

The collected e-waste is exported to Malaysia, China, Germany, Korea and even the United Kingdom. Malaysia and China, the experts in recycling, are the main dealers. After exporting the e-waste to these countries, a certificate is issued to ensure that the e-waste sent was properly recycled.

Green Links Lanka, who caters to more than 100 clients, has signed a memorandum of understanding with the Central Environmental Authority (CEA). Apart from Holcim (Lanka) Ltd, Sri Lanka's premier companies in banking, telecommunication and electrical equipment work in hand in hand with us to create e-waste free Sri Lanka.

After collaborating with Geocycle, we were able to expand our services and currently it has become a national service. Hence island-wide awareness programs have been carried out through mass media, seminars and journals to make people realize their role in this process. We have also implemented a text messaging programme to further circulate the message of waste management.

Our company has exported nearly 4000 tons of e-waste from Sri Lanka. Moreover we possess a well-organized waste collecting network within Colombo and across the entire country, which provides reasonable value for e-waste.

There is a long and often complicated chain of events in the e-waste problem, beginning from an idea that someone has for a new product and then its production, and ending in its purchase and eventual disposal by the user. By engaging with various stakeholders and using relevant scientific wisdom within this chain of events, we are on the way to solving the e-waste problem.

Green Links Lanka is totally dedicated to improving e-waste recycling facilities in Sri Lanka and the ultimate target is to start recycling within the country without exporting the waste to other countries. This will in turn result in reserving foreign exchange. Furthermore, there has been a long felt need for the government to give attention to starting a proper recycling process. The government and the corporate sectors need to stop selling e-waste in improper ways such as at auctions and tenders since it causes bad effects when e-waste goes to unauthorised people. So it is advisable to recycle e-waste without harming nature for a greener tomorrow.



Eng. H.N. Gunadasa
BSc Eng, PGDip in Env. Eng. & Mgmt
Industrial Technology Institute

The role of ITI in helping industries in Sri Lanka with waste management

The Industrial Technology Institute (ITI) is a statutory board which came into existence on 01st April 1998 by virtue of the Science & Technology Development Act No. 11 of 1994 with the mandate to elevate the level of technology in Sri Lanka for the purpose of rapid industrialization.

Providing industries with technological support for waste management is one of the key functions of the ITI since industrialization cannot accelerate unless issues of industrial pollution are properly addressed.

Environment Technology is a constituent of the Research and Development division of ITI which provides demand-driven environmental services and undertakes R&D projects to develop technologies or obtain information for effective solutions for critical environmental problems in Sri Lanka. Apart from being a trusted advisor to the regulatory bodies on policy regarding sustainable development activities, the Environment Technology arm of ITI is also the leading provider of Best Practicable Technology (BPT) for local industries.

Also, due to a strong belief in its responsibility towards the people, this division strives to provide innovative and effective solutions to environmental and industrial pollution problems within the country.

Facilities available at ITI to provide industrial pollution control services include undertaking contract projects, providing consultancy services, undertaking funded projects for research & development, organizing training programs, and designing customized services to solve specific pollution problems of the industry. Details of some services are listed below.

- Undertaking turnkey contracts for treatment of wastewater and air pollution control.
- Undertaking contracts for preparation of Environmental Impact Assessment (EIA) reports or Initial Environmental Examination (IEE) reports that are required for approval of new industrial projects.
- Consultation on designing of wastewater treatment plants, air pollution control systems & industrial ventilation systems. Assessment of the environmental pollution status of industries

in operation, solid waste and hazardous waste management etc.

- Provision of customized services for troubleshooting in existing pollution control systems, performance assessment of existing waste treatment plants, improvements for industrial ventilation facilities.



- Carrying out pilot scale or laboratory scale trials on wastewater treatment for technology adaptation.
- Carrying out air dispersion modelling studies using AERMOD View & CALPUFF View software.
- Undertaking R&D projects to find solutions for major environmental pollution problems of the country.
- Carrying out capacity building training programs for industries on wastewater treatment.
- Technical evaluation of proposals received by industries for implementation of wastewater treatment plants or air pollution control systems.
- Consultation for ISO 14000, waste audit or cleaner production program.

Some major projects completed during the past are listed below:

R&D Projects

- Development of cost-effective treatment technology for textile industry effluents and demonstration using pilot scale package treatment plant.
- Development of cost-effective treatment technology for Desiccated Coconut industry effluents and demonstration using pilot scale package treatment plant.

- Development of bio filter for removal of odorous Volatile Organic gases and demonstration of technology using pilot scale package treatment plant.
- Pilot study for recycling of treated wastewater using a reverse osmosis plant for Ansell Lanka (Pvt) Ltd.



- Design & construction of chemical treatment plant with plate clarifier for treatment of nylon fabric dyeing effluents for Noyon Lanka (Pvt) Ltd.
- Design & construction of biological treatment plant for recycling of vehicle service effluents for Prestige Automobile (Pvt) Ltd.
- Design, construction & commissioning of sewage treatment plant for Quantum Clothing Lanka (Pvt) Ltd.
- Design & construction of chemical treatment plant for destruction of active ingredients in effluents generated from pesticide repacking plant, Harrison's Chemicals (Pvt) Ltd.
- Design, construction & commissioning of sewage treatment plant for Hemas Manufacturing (Pvt) Ltd.

Wastewater Treatment

- Design & Construction of Effluent treatment Plant, including aeration tanks & dissolved air floatation unit for MAS Fabric Park (Pvt) Ltd.
- Design & implementation of treatment plant with anaerobic filter & aeration tanks for treatment of distillery effluents for ACME Lanka Distilleries (Pvt) Ltd.



- Design & implementation of treatment plant with anaerobic filter & UASB system for treatment of distillery effluents for Rockland Distilleries (Pvt) Ltd.
- Design & construction of chemical treatment plant for treatment of nylon lace dyeing effluents for Pym Intimate Lanka (Pvt) Ltd.



- Design & construction of chemical treatment plant for solid bearing effluent streams of latex glove making plant at Ansell Lanka (Pvt) Ltd.



- Design & construction of effluent treatment plant (Chemical & biological) for sewing thread dyeing plant of Coats Thread Lanka (Pvt) Ltd.
- Design & construction of anaerobic filter, UASB & aeration system for treatment of distillery effluents for Beruwela Distilleries Ltd.
- Design & construction of UASB & aeration system for treatment of distillery effluents for Distilleries Company of Sri Lanka Ltd.
- Upgrading of treatment plant with Sequence Batch

Reactor (SBR) for treatment of fruit canning effluents at Fruit & Vegetable (Pvt) Ltd.



- Upgrading design & commissioning of lead fume scrubbing unit for lead battery scrap smelting plant of Navam Lanka (Pvt) Ltd.
- Design of wet scrubber system for removal of sulphur dioxide emission released from the cinnamon bleaching operation at Spiceco Ltd.

- Design & construction of treatment plant for Nylon knitted fabric dyeing effluents at Strechline (Pvt) Ltd.
- Design & implementation of treatment plant for soluble lead contaminated effluents generated from Litharge manufacturing plant, Kailash Metachem (Pvt) Ltd.
- Design & construction of biological treatment plant for effluents generated from herbal consumer product manufacturing plant of Link Natural Products (Pvt) Ltd.
- Design & construction of chemical treatment plant for fabric dyeing effluents at Linea Intimo (Pvt) Ltd.
- Design & construction of biological treatment plant for recycling of vehicle service effluents for Hyundai Automobile (Pvt) Ltd.



- Design of wet scrubber system for steel scrap melting furnace of SR Steel (Pvt) Ltd.

Solid waste & Hazardous Waste



Air Pollution Control

- Design, fabrication & installation of oxidation scrubber system for removal of odorous VOC from chicken offal rendering plant at Bairaha Farm Ltd.
- Design & commissioning of lead fume scrubbing unit for lead battery scrap smelting plant of Nico Battery (Pvt) Ltd.
- Test burning operation of PCB in Holcim's Puttalam cement kiln to assess its destructive ability in accordance with the most stringent regulatory requirements existing today to generate basic information required for the EIA for the proposed project to establish a hazardous waste co-processing facility.
- Assessment of hazardous characteristics of tsunami affected ship cargo for safe disposal, Sea Consortium Lanka (Pvt) Ltd.
- Assessment of hazardous characteristics of remains in the fire affected stores complex for fibreglass raw materials, USS Services (Pvt) Ltd.

- Assessment of hazardous characteristics of remains in the fire affected ship waste contaminated with Thiodicarb insecticide, Green Lanka (Pvt) Ltd.

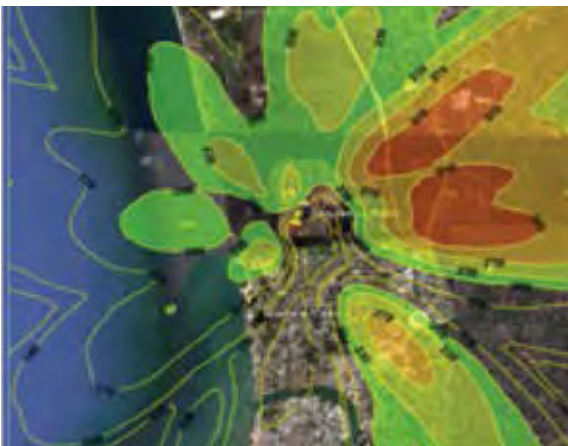
EIA

- Preparation of EIA report for the proposed project to manufacture base oil for lubricant by re-refining used oil, Sunchemie Industries (Pvt) Ltd, Puttalam.
- Preparation of EIA report for the proposed export processing zone for textile industries at Horana, for Board of Investment, Sri Lanka.
- Carrying out Air Dispersion Modelling for Proposed 300MW Combined Cycle Power Plant – Phase I at Kerawalapitiya using ISC-AERMOD View software as a part of the EIA prepared by Lakdhanavi (Pvt) Ltd.



setup at Mathugama Industrial Estate.

- Environment Impact Assessment for Pre-Processing Facility (PPF), in Export Processing Zone, Katunayake, Sri Lanka



- Carrying out Air Dispersion Modelling for proposed 300MW Combined Cycle Power Plant – Phase II at Kerawalapitiya using ISC-AERMOD View software as a part of the EIA prepared by Environment Management Lanka Ltd.
- Preparation of EIA report for the proposed export processing zone at Keragala & Henegama for the Board of Investment, Sri Lanka.
- Preparation of IEE report for proposed hazardous waste collection, storage & pre-processing facility at Peliyagoda for Holcim Lanka (Pvt) Ltd.
- Preparation of EIA report for the proposed project to disinfect healthcare waste using Hydroclave system in Colombo by Finlay Rentokil Ceylon Ltd.
- Carrying out Air Dispersion Modelling for Proposed Sulphuric Acid Plant to be established at Horana Export Processing Zone using ISC-AERMOD View software for Board of Investment, Sri Lanka.
- Environment Impact Assessment for Proposed Detergent & Surfactant Manufacturing Project to be



Sustainable agriculture at Dilmah conservation

Traditionally, the Sri Lankan villagers were self-sufficient, with all their immediate needs for sustenance and shelter and medicinal requirements for basic illnesses being obtained from their surroundings. They had only to step into their home gardens to fill their requirements for vegetables, fruits, and herbs. This was both convenient and cheap, and this self-sufficiency was inextricably linked to the possession of a sizable home garden, a feature in almost every rural household. However, with the rapid levels of urbanization being experienced at present, the need for housing, particularly close to large cities, has led to the extensive fragmentation of plots of land previously used for home gardening. Therefore this self-sufficiency has all but ceased to exist. Today, a majority of the population has become dependent on the marketplace for all their needs. This dependency has brought about an explosion in the cost of living, making a serious dent in their monthly budget. This is placing additional burdens and stresses on the wage earner.

The Dilmah Conservation Sustainable Agriculture Research Centre (DCSARC) is currently promoting organic agriculture in homes to encourage healthy eating habits and as a cost-effective mechanism to address the rising cost of living. Located at the Moratuwa MJF Centre, the products at DCSARC were recently certified as organic by SriCert, the leader in



certification of organic products in Sri Lanka. This programme focuses on recycling both organic and inorganic household waste in the cultivation of these urban home gardens. It utilizes materials such as pieces of off-cut plastic piping and wooden pallets sourced from the Dilmah factory as well as food remnants and other organic waste.

DCSARC has developed a novel and innovative solution to overcome the lack of space in the average urban household, where floor/ground area is critically restricted due to high land prices and limited available space. DCSARC has demonstrated how best to utilize available space and create a garden that is beneficial in every sense. Where an extension on a horizontal plane is not possible due to space restrictions, DCSARC has shown how it is possible to extend the garden on a vertical plane. This innovation was made possible by using the wooden pallets used in the storage of tea sacks. This is an item that is considered to be waste once the tea sacks have undergone packaging for the market. Thus, an item of refuse is now being reused to contribute significantly to the reduction of living costs and the provision of required vegetables and fruits for the table. Of greater significance is the fact that such productive activity generates an immense amount of satisfaction and achievement for the grower, especially for the modern urban-dwelling human who lives within the confines imposed by industrialization. This will lead to a feeling of wellbeing and better mental health, in addition to the other benefits mentioned before.



For more details visit the Dilmah Conservation Sustainable Agriculture Research Centre at <http://moratuwa.mjffoundation.org/>



Waste management practices at Maliban

With over fifty years of experience in manufacturing snacks which everyone loves, Maliban Biscuit Manufacturers Limited is a legendary biscuit maker in Sri Lanka. Remembering our roots, and looking forward to the future, Maliban steps in to this new generation with the confidence gained from the past fifty years of expertise in offering super quality biscuits.

Maliban Biscuit Manufacturers reinforced its commitment in protecting the consumer's environment in its processes, while emphasizing on high quality and innovation, as a result of which the company won the Gold Award at Geo Responsibility Awards 2011. Maliban became the only biscuit company in Sri Lanka to win this prestigious award.

Considering environment impacts we believe that management of waste is essential for promoting sustainability. Under this concept, we consider the importance of waste segregation and waste disposal for the development of our organization. Waste could be categorized under different categories such as solid and semi solid waste, liquid waste and gaseous waste.

Periodically our environment management team evaluates all the aspects which causes any impact to the environment. We identified the solid waste as the most significant aspect which can be categorized under biodegradable and non-biodegradable. Biodegradable waste is handled in two ways such as composting and animal feeding.

BIODEGRADABLE WASTE



- Lunch waste
- Garden waste

COMPOSTING

ANIMAL FEEDING

- Damaged biscuits
- Dough scrap
- Expiry biscuits
- Rejected biscuits
- Rejected cream
- Sweeping flour
- Sweeping sugar
- Crushed biscuit damages

NON - BIODEGRADABLE WASTE



Non biodegradable wastes are further categorized under hazardous and non hazardous which could cause a heavy impact to the environment.

Each and every item used for plant and equipment as well as service purposes are identified and segregated prior to disposal as waste. We send the identified non hazardous waste for recycling to a third party in order to extend its shelf life. However disposing of hazardous waste (chemical, spillages, flavors) is a worldwide issue for which we are researching to find effective solutions in the near future.

Currently Geocycle, in Sri Lanka has provided an environment friendly solution in this regard. We dispatch all identified waste materials which cannot be disposed through normal channels to Geocycle for environmental responsible disposal without leaving any impact to the environment. In addition,

this process helps to reduce the amount of raw waste going to open dumps and also to conserve natural resources for future generations. This process has also provided many job opportunities for our people. Beside that it helps to reduce the possibility of causing soil and water pollution and also restricts the release of methane from landfills.

Liquid waste

When we were in the process of obtaining our ISO 14000 certification nearly 6 years ago we identified liquid waste as a significant aspect. Waste water is discharged from production activities, lunch room and wash rooms etc in our factory. About 32 meter cubes of water is disposed on daily basis as waste. After spending more than 15 M rupees we built a ETP (Effluent Treatment Plant). The treated water is now used for gardening and toilets flushing activities etc.



Our Effluent Treatment Plant (ETP)

Material efficiency improvement

Under the improvements done through the cleaner production concept in our production processes starting from raw material receiving point, dough preparation, cutting, moulding, baking, picketing etc we were able to achieve high material efficiency by minimising waste and reducing energy.

In one of our projects we brought down the reel width of wrappers by reducing average of 10mm width and 0.1-0.2g weight per wrapper. Here we considered 5 different products without disturbing the product appearance. As a result of this project a total weight of 2.6 MT wrappers are saved per annum.

Energy saving project

When we developed the concept of cleaner production in our organization our engineering dept focused on

a list of all the possible energy saving projects in the company as environment management programmes and prioritized considering the saving of energy costs. For instance, one of our oldest ovens in which the operation was manual was modified to operate under automatic thyristor system. Thus we were able to improve the baking quality and reduce energy consumption by nearly 30%.

Over the years we have won the hearts of all our customers. We are an organization with good moral values and always believe in supplying the best to our customers while promoting sustainable development. Maliban has become the strength of the past and present generations and will continue to be a strength of the nation as a trusted brand name that offer nothing but the best in quality, taste and nutrition to all our customers throughout the globe.



Chalaka Fernando
Environment & System Compliance Manager
Holcim (Lanka) Ltd.

Extended Producer Responsibility (EPR) : the beyond compliance corporate responsibility

The twentieth century began with a world population of 1.5 billion; the twenty first begins with 6 billion and is headed to nearly 10 billion by mid-century. These large increases in population, along with rising standards of living and consumption, are increasing the pressures on the earth as both a source of our resources and a sink for our wastes (Fishbein, et al., 1998).

Over the last few years, ecological concerns and global warming have spurred considerable interest in practicing more eco-friendly, sustainable initiatives to reduce environmental pollution and anthropogenic emissions by all possible means (Fernando & Jayasinghe, 2013). Driven by this approach of achieving a greener environment, many countries and corporate entities have started applying sustainable concepts to their manufacturing processes. The increasing number of ISO 14001 certified companies or industries reflects this greater interest among manufacturers in driving sustainability. The number of companies gaining ISO14001 certification increased to 250,000 in more than 150 countries (business Green, 2012). However, this requirement is highlighted only in one aspect of the whole process: the production aspect. Hence, sustainable production has been given more emphasis than sustainable consumption in most instances (Fernando & Jayasinghe, 2013). In the current global manufacturing arena, producers will be failing to act in the most responsible manner if they forget to consider the entire life cycle of their product. There are a number of tools and systems derived to systemize the life cycle analysis of product (or a service).

Many will argue that sustainable consumption is the responsibility of the consumer of a product. However, recent studies have highlighted that producers have an equal responsibility in giving an assurance that a product's life cycle will be sustainable when it reaches the market. This is known as the Extended Producer responsibility (EPR), a strategy that encourages a closed-loop pattern of materials use. OECD defines EPR as an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle (OECD, n.d.). Simply, it makes manufacturers responsible for the entire lifecycle of the products and packaging they produce (Institute for Local Self-Reliance, 1993). Although EPR is widely in practice, there is a lack of awareness among consumers, so that they are unable to contribute towards or obtain the benefits of such initiatives.

Extended Producer Responsibility is an environmental protection strategy to reach an environmental objective of a decreased total environmental impact from a product, by making the manufacturer of the product responsible for the entire life-cycle of the product and especially for the take-back, recycling and final disposal of the product (Lindhqvist, 1992).

A few examples of EPR practices:

1. Introducing a mechanism to recall used CFL bulbs by Orange in Sri Lanka
2. Recalling used printer cartridges: HP products (not available in Sri Lanka)



Dharshani Lahandapura
 Communication Coordinator – Geocycle
 Holcim (Lanka) Ltd.

The real cost ? Internalize negative externalities created by wastes in product pricing

Those involved in product pricing endeavor to cover all possible costs comprehensively, from raw material, manpower, machinery, and logistic arrangements, to even marketing and advertising. Even the CSR budgets of organizations are included. The cost of the damage to the environment is, however, left out. Dumping huge piles of solid waste and/or discharging toxic effluents into water bodies contaminates and degrades the quality of the environment and destroys Sri Lanka’s scenic beauty. If adequate remedial steps are not taken, this will leave a great burden on future generations. This is one of the main negative externalities in production. Negative externalities are the costs incurred by third parties who are not involved either in the production or the consumption of these goods.

In many countries in the west, huge sums of money have to be spent to recover and restore waste dump sites and water bodies which were contaminated by industries a few decades ago. General Electricals (GE), USA, has to pay nearly 1.3 billion USD (according to the latest estimation) for contaminating the Hudson River for 30 decades by dumping PCB, which is a very toxic substance. If GE had understood the importance of properly disposing of the waste they generate, they could have calculated the disposal cost and included it in the product pricing. But instead, for three decades, a long stretch of the Hudson River was contaminated, affecting humans and the flora and fauna of the area. This led to a considerable hidden cost for individuals and elements not necessarily involved in the production



or consumption processes, which the company has to compensate for now.

Sri Lanka is a country that has just accelerated in the journey towards development, so we are in a position to learn from the mistakes others have made before us. Booming industries no doubt generate a higher volume of industrial waste, with more resultant environmental issues. Hence it is high time that the government intervened to internalize those negative externalities of industrial activities. Among the few mechanisms to internalize negative externalities, introducing a taxation system based on polluter pay principles takes a prominent place. This is the approach most commonly seen around the globe. Introducing a tax leads to an increase in the cost both for the producer and the consumer. This will control overproduction and overconsumption.

Another approach that the government could take is to impose limits on the pollution. The National Environment Act No. 47 of 1980, subsequent amendments to the Act, and the following gazette notifications are good examples for this:

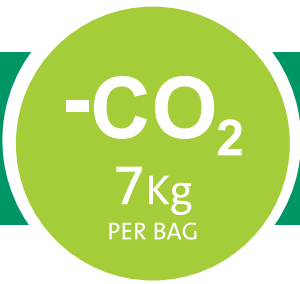
- Extra Ordinary Gazette – No. 1562/ 22 of 15.08.2008 on ambient air quality
- Gazette No. 1137/35 of 23.06.2000 on mobile air emissions
- Gazette No. 924/12 of 21.05.1996 on noise controlling

Another method is to issue marketable pollution permits, which is the new development seen in some parts of the world. Here governments have moved towards market-based incentives to reduce pollution. This approach involves the creation of a limited volume of pollution rights distributed among polluting firms, which can be traded in a secondary market. This is intended to encourage utilizing lowest-cost pollution reduction measures and exchanging revenue by selling surplus pollution rights. Companies that have efficient pollution reduction programs can save their permits and trade them with other businesses.

A very proactive approach is subsidizing positive externalities, instead of taxing negative externalities. This helps to reduce the production cost for suppliers and motivates them to be environmentally friendly. Apart from action taken by the government, some responsible corporations have also adopted the “cradle

to grave” concept of responsibility, or “Extended Producer Responsibility”, where the responsibility of disposing of the product is borne by the producer and the cost is integrated into the pricing. This strategy will also give producers an incentive to design sustainable, less hazardous, longer lasting products.

However, if consumers neglect to remedy the negative environmental effects of their consumption patterns, the benefits will be minimal. Hence, it is important that consumers also consider their environmental footprint and adopt practices of “responsible consumerism” such as buying green, buying fair, and buying less, so that the efforts of the government and producers will not be wasted.



Your contribution to reducing the carbon footprint

Holcim Sanstha Supiri

Cement is an indispensable binder for concrete. The cement manufacturing process, by its nature, creates high CO₂ emissions, especially during the clinker manufacturing/ calcination/ carbonisation process. Since the industry is resource energy intensive, Holcim (Lanka) focusses on sustainability for the entire value creation cycle-from design, to production, to placing concrete and on to its life time use. In tandem with this process we constantly design new value additions for our cement. Cement manufactured with reduced carbon emissions is one of our key achievements.

Holcim's Sanstha Supiri is an example of this kind of innovative cement best suited for the times we live in, helping to contribute to reduce CO₂ emissions while at the same time offering excellent value for money.

A state-of-the art product using an innovative blend of raw materials with less clinker content, in combination with cutting edge production technology, Holcim's Sanstha Supiri is the result of intensive research and application experience, considerably reducing the environmental impact, it is a high-quality cement with a reduced environmental footprint, supporting excellent concrete application, with superior structural properties.

Special benefits

Holcim Sanstha Supiri is a Portland blended-cement technically defined as SLS1253:2008 and also CEM 11/A-LL 42.5 N Standard. It is a high value natural limestone sourced from our quarry in Sri Lanka. Vast reserves of it ensures sustainability and availability for many generations to come. The quarrying process has been perfected and fully controlled by Holcim and ensures minimum wastage and a uniform quality, so that a consistent product is assured.

Applications

Holcim Sanstha Supiri has a range of applications for concrete including:

- Pre-stressed Concrete
- Structural Concrete
- Brick walls/ Plastering
- Non reinforced Concrete

Given its excellent structural properties, the cement is especially suited for applications. Its low bleeding vulnerability is a plus and it is compatible with all concrete admixtures available in the market. It can be used without any restrictions as per SLS 1253/EN 197-1:2000 Standard as Fair-faced Concrete, Full Faced Concrete, Pumped Concrete, Self-leveling Concrete, Self-compacting Concrete, Light weight Concrete, Shotcrete Concrete, Sprayed Concrete and Recycled Concrete. In short, it is ideal for any sort of application, for example for Hotels, multi-storeyed buildings, residential and public buildings, commercial centers and individual houses etc.

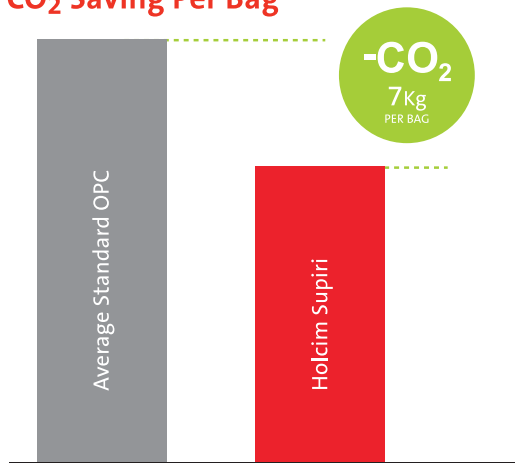


Global warming has an adverse impact due to the green house gas effect, mainly caused by propagated CO₂ emissions.

Green environmentally friendly cement - Our hallmark

Holcim has taken upon itself the responsibility of developing and producing products which are specially environmentally sustainable. The company's Holcim Sanstha Supiri is the logical outcome of this policy of environmental sustainability, reducing the environmental impact without any compromise to quality. Holcim is setting new benchmarks within the industry while strictly adhering to national and international industry standards. At Holcim, sustainability is not a mere slogan, but an important aspect of its corporate philosophy, starting from product development, quarrying, production, transport and engineering and architectural solutions including application practices.

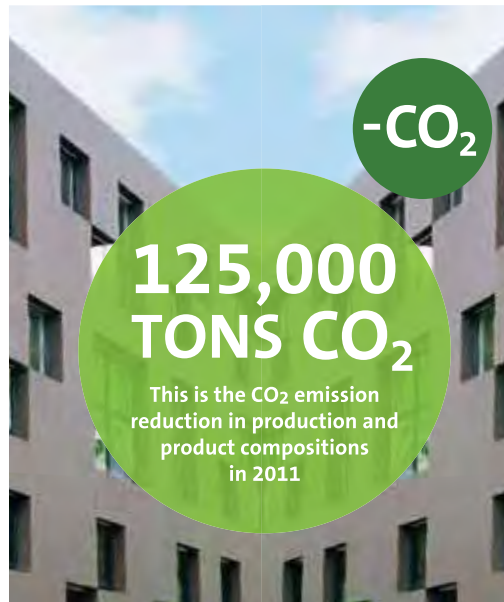
CO₂ Saving Per Bag



Savings compared to Average standard OPC

Environmental benefits of using Holcim Sanstha Supiri:

- Significantly reduced CO₂ emissions
- Substantially reduced energy intensive clinker content due to use of a very high reactive local clinker
- Assured consistent quality, with our excellent coefficient of variation (CoV)
- Conserved finite resources
- Qualified for Green Mark, GBCSL, LEED's, and other certifications



Holcim Sanstha Supiri significantly reduces CO₂ emissions compared to standard Ordinary Portland Cement (OPC). This is the result of utilizing high quality clinker substitutes. These additives contribute to reduce CO₂ emissions whilst ensuring no compromise on quality or strength. This type of cement enables highest strength of concrete. Come see for yourself or call our experienced technical service personnel.

Our cement is produced under environmentally optimized conditions, especially focusing on a fuel mix employing alternative fuel methods. Thermal fuels, which are either carbon neutral or carbon reducing, are used for the production process thereby substantially reducing the entire carbon footprint.

In contrast, traditional production methods employ considerable amounts of thermal power and electricity which emit large quantities of greenhouses gases. The chart below demonstrates the significant reduced emission of CO₂.

Going Green with Local Resources

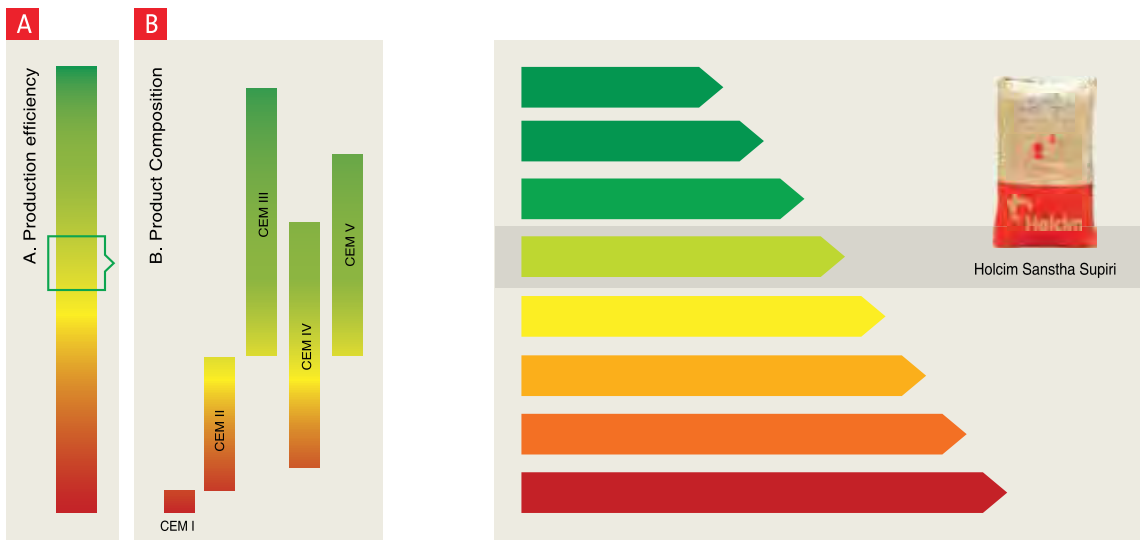
Holcim's Sanstha Supiri is a top quality Sri Lankan product using the finest raw materials which are sourced locally. Manufactured in Sri Lanka at a state-of-the-art facility in Puttalam.

CO₂ emission reduction

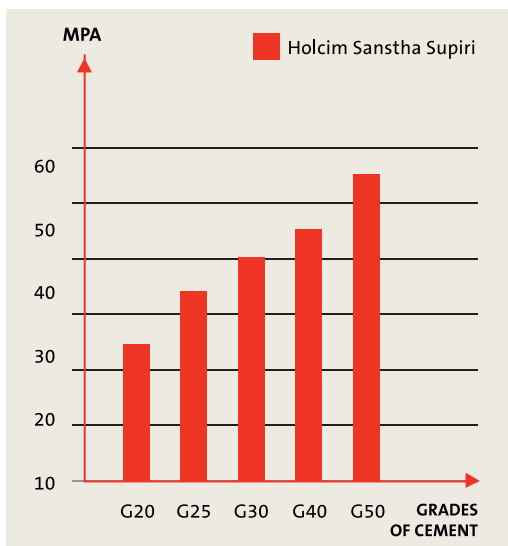
Ranking taken in to account

A. Production efficiency, B. Product Composition

The transportation distance is herewith not taken into account, but is a major factor in an overall balance

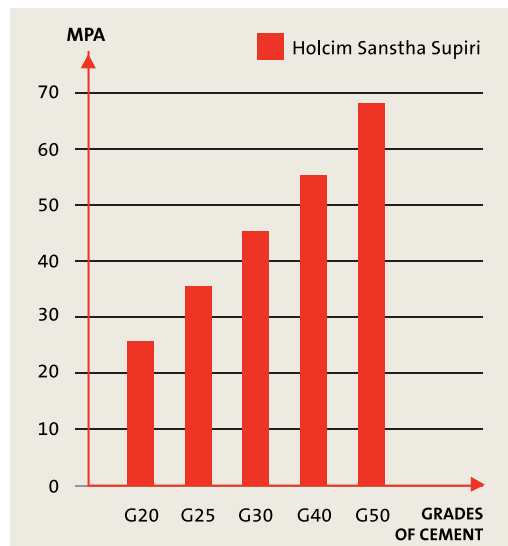


7 days compression strength



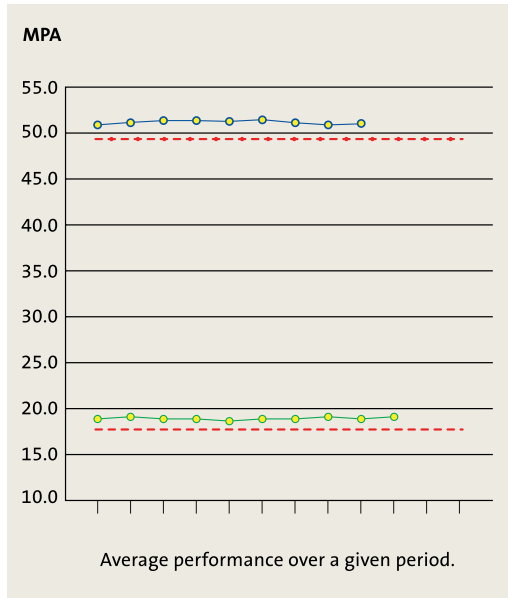
Source: I&A Center Laboratory, Colombo

28 days compression strength



Source: I&A Center Laboratory, Colombo

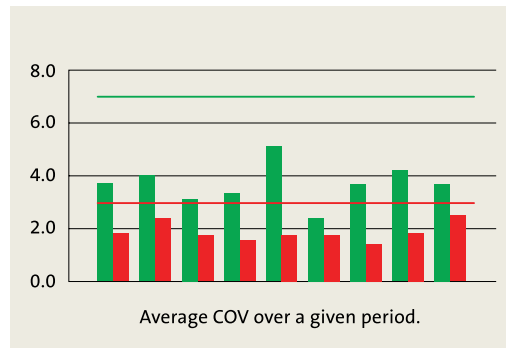
PLC Performance Mortar



SOURCE : Laboratory At Puttalam Cement Works

—○— 1D Actual —○— 28D Actual
- - - min 1D target - - - min 28D target

CoV of PLC



SOURCE : Laboratory At Puttalam Cement Works

■ CoV_2D ■ CoV_28D
— max 2D COV — max 28D COV 2

For further information please consult our sales staff or I&A Center Staff.

Coefficient of variation (CoV) of cement is dispersion of strength with results around their mean value. CoV is expressed as a percentage of standard deviation divided by mean.

Holcim (Lanka) Ltd., produces very high consistent product with optimal CoV of less than 7% after 2 days and less than 3% after 28 days strength.

The right type of cement with an optimal CoV enables the engineer to prescribe the minimum required concrete strength class (and therefore dosage of cement /m³), resulting in using less amount of cement. Using an environmentally-friendly cement with no compromise to quality and optimal CoV, saves costs for the structural engineering and leads ultimately to lower CO₂ emissions.

Center. They work with our regional team in developing solutions such as high-strength concrete, durable concrete, permeable and other new variants of concrete, optimal mix designs, etc.

Sustainable Quality Initiatives

Holcim is continuously engaged in developing technologies and techniques to reduce our carbon footprint, while adding value to the customer's need, such as; in time savings, investment cost reduction due to a more cost effective and enabling ease of construction. For your convenience, a team of concrete specialists and qualified engineers is ready to support you at the Innovation & Application

Holcim Geocycle is a unit created for permanent and professional sustainable waste management, we offer professional waste management solutions in order to dispose your waste from your construction site in a responsible and environmentally friendly manner. Geocycle can also provide you with solutions for waste management, post construction for operational management. We are an experienced solutions provider for all your waste, we can offer you ISO certified solutions. Above all Geocycle encourages corporate environmental leadership through knowledge sharing, sustainable waste disposal and waste reduction and recycling, (5R: reduce, reuse, replace, recycle, reinvent).

Promoting Excellence in Construction Practices

The choice of quality building materials alone does not ensure durable high quality concrete. The right construction practices also need to be followed. Experienced masons formally trained with qualifications such as NVQ2 or NVQ3 are well equipped to provide best practices in construction. Please consult www.masons.lk for further details. Here you can search for experienced and or certified masons for your projects in your region. You will find trained masons from this non profit website. Interested parties can register on this site for free and have the advantage of being able to book a suitable mason directly from the website. At Holcim we are convinced that employing knowledgeable masons, fills an important gap in the industry in producing durable concrete, and to ensure sustainable construction.

In summary

You as an owner, developer, planner, architect, engineer or consultant and Holcim as a responsible material supplier, together we can make a difference to the sustainable built environment, by developing sustainable policies, choosing the right sustainable final product that embeds a cost effective structural and architectural design and selecting environmentally friendly materials and sustainable construction practices, with qualified personnel including skilled masons. You can also set the standards for lowering construction and operational costs.

We at Holcim will support you across the value chain from a material perspective to ensure sustainable construction.

CO2 reduction in construction can be influenced by...

- Setting the right policies
- Setting the standards
- Creating a sustainable set of objectives by the developer in contrary to green decorative elements
- Defining the specification in the tender document
- Design elements and structural design
- Choice of the right concrete/ strength/ class
- Choice of quality materials with best suited overall durability, performance and avoiding unnecessary addition of materials
- Co-efficient of variation of the materials and definitions in the specs, technically proven records, environmental compliance records that transparent quality controls in place, controls which are jointly executed by the site consultant and contractors involved and material suppliers, until the 28 day strength of the hardened concrete
- Workmanship execution and controls by the site consultant in place
- Effective training in place

Standards & Certifications

Holcim Sanstha Supiri comes under the Sri Lankan SLS 1253:2008 standards, and is also CEMII-A-LL 42.5N of BF EN197-1:2000 standard. It has also been awarded the British Standard Institution's Quality Product with the new 17025 certification. A top quality product made in Sri Lanka, meeting highest standards, both local and international ones.



Thilak Jayathunge
Head of Concrete, Innovation and Application
Holcim (Lanka) Ltd.

Innovative solutions for sustainable future

Knowledge Hub for Concrete and Aggregates

Recording a remarkable growth of 17.3 per cent, the Construction Industry of Sri Lanka was ranked the second highest sector of growth last year according to Central Bank reports. Being suppressed in the clutches of a war that lasted for three decades, Sri Lanka is now looking forward to heal its wound of war by way of growth and development. Thus priority is given to infrastructure development where the potential growth of the country is displayed. With major scale development projects such as highways, ports and bridges taking place in the country, the construction industry is now in the momentum of growth. Though favorable conditions for growth are observed less has been done to enhance and accelerate this growth by carrying out research and experiments.

Innovation & Application center offers a wide range of services

Understanding the need for an institutional platform to carry out research and development activities related to the construction industry, and as a company that feels the pulse of the industry, Holcim Lanka has established its Innovation and Application Center (I&A). Situated in Orugodawatte, Dematagoda, it is the only institution in Sri Lanka with a laboratory accredited by the Sri Lanka Accreditation Board (SLAB) for concrete and aggregates.



Through international experience, knowledge and expertise, Holcim's vision is to make I&A Sri Lanka's leading institution for concrete innovation and application. Equipped with cutting edge technology, the I&A offers a range of value-added services to major scale infrastructure projects and ready mix customers whilst adopting a customer friendly approach with the intention of providing the best possible service to its customer. The energetic and highly qualified workforce consisting of professional engineers and technicians at I&A are always prepared to enlighten customers with their expertise to meet the challenges of the construction project of the customer.

Being the industry's best innovative solution provider, the I&A will serve its customers by way of providing technical knowledge on cement, concrete and construction related activities. Customers will also have the privilege of obtaining first hand information on solutions to the concrete industry such as mix design solutions and product solutions. The I&A's remarkable laboratory facility provides customers the advantage of obtaining accurate information with the help of accredited testing facility and testing knowledge of the I&A workforce which will facilitate in improving the standard of products of a Ready Mix plant.



Why is I&A is important to a customer Concrete service packages introduced by the I&A will help to reduce the enormous pressure that has to be borne when running a ready mix concrete plant as these packages are designed to improve the efficiency of the customer's plant which will facilitate in improving the quality of production. With qualitative production, the business will receive the reputation it deserves.

The I&A aspires to offer their services according to three categories with the aim improving the overall production efficiency of a plant. The three categories which are as follows; services to improve the quality of concrete, services to improve operational efficiency and services to improve the skills of people - all which will not only contribute in ameliorating the profits and revenue of a plant but also in maintaining the good will of the said plant with its customers. By bonding with I&A to improve the efficiency of one's plant, the customer will gain peace of mind. The Concrete service packages which adhere in improving the aforementioned categories of a ready mix plant is the brainchild of the I&A that is introduced to provide a complete and a qualitative service to its customer.

Packages to Improve Quality

When in production, quality is a crucial aspect that has to be looked into because qualitative production ensures long term sustainability and enhances the competitiveness of a business. The I&A offers three exclusive packages which will cater to look into the aspects of improving the quality of production in ready mix plants.

The Evaluation of Fresh and Hardened Concrete at the Plant and Quality Control Schemes

The evaluation of fresh and hardened concrete at the plant and quality control schemes will make the optimum use of the available resources of production and thereby will improve the profit margins of a business. This mechanism will be carried out by the I&A through weekly



I&A Testing facilities visits to the customer's plant by their mobile service where the I&A team will analyze the performance of produced concrete in that

plant. The batching system will also be reviewed and recommendations will be made by the I&A after monitoring and reporting all variations in the batch system. After the process of monitoring, the Innovation Center will introduce effective quality control procedures to the plant and will also undertake the task of training the employees of the said plant to adopt and practice the introduced quality control practices. To ensure the continuous practice of quality control methods, the I&A Center will conduct sudden audits in the plant and will rate the plants accordingly.

Inbound Raw Material Control

To encourage the usage of quality raw materials, the I&A Center offers a value added service package to test the aggregate quality of raw materials used against the quality of concrete produced. Through their continuous visits to ready mix plants, they will monitor and report all the variations in the aggregate quality. This will always ensure the output of a qualitative product that can even compete against international markets. With the help of this package, ready mix plants can minimize failures and complaints about quality which will facilitate in building a good reputation among its customers and eventually will help in increasing the revenue.

Quality Assurance Schemes



To uplift the overall qualitative production standards of a ready mix plant, the I&A Center offers a service package of implementing quality control schemes where novel mix designs will be developed while making the optimum use of the existing mix designs. I&A, always taking a step ahead, will innovate and introduce new concrete products and the team also offers the service of providing guidelines for quality assurance. As innovation always pro-

vides way for novel opportunities in the industry, businesses will have the chance develop and be a sustainable business entity in the long run.

Packages to Improve Skills of Employees



For a business to have a successful production mechanism, a skilled and qualified workforce is vital. The I&A, having realized this rationale, has implemented a range of services where employees on ready mix plants will be trained.

Training for RXM Truck Drivers

The training program for ready mix truck drivers is intended to educate them with the basic knowledge of concrete and tests that might be carried out in their presence. The knowledge on basic concrete technology will enable the driver to adopt himself to the quality control practices of the business and thereby will help him to provide a far better service in his job. The training program will educate the drivers on the basic concrete technology of factors that affect the strength of concrete, bleeding, workability and cohesion of concrete, basic knowledge

of the slump and the cube tests and how to overcome delays, contamination and spillages during transport.

Training for Lab Technicians

This program is recommended for supervisors and senior technicians in the construction industry where they will be provided the opportunity of learning about concrete and its applications, concrete mixes and concrete finishes.

Training for Lab Managers

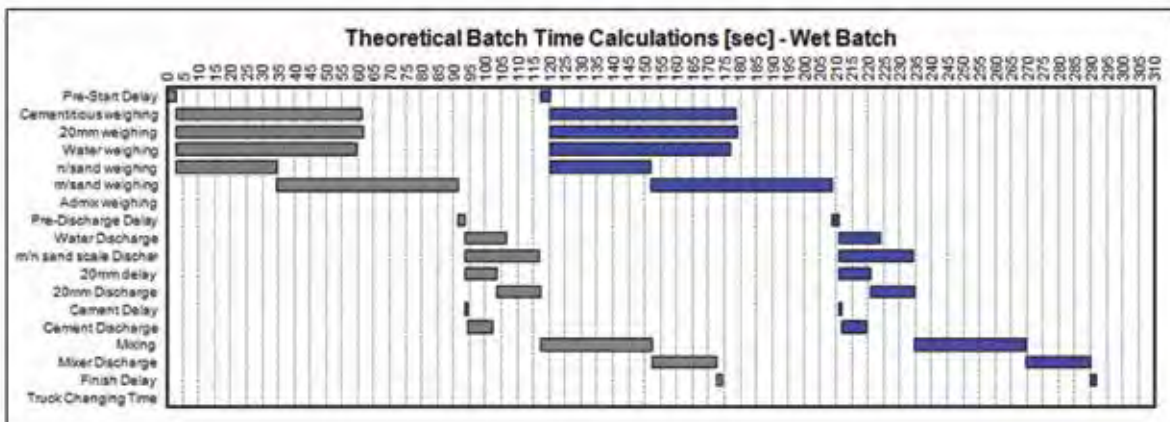
Designed for lab technicians, this training program will train the technicians on the test methods of BSEN, ASTM and DIN which are frequently used in the most performed tests on concrete. The course will be carried out with in

depth discussions on the said subjects including practical sessions and laboratory demonstrations. Technicians will also be educated on materials of concrete and basics of concrete technology, different types of cement and their uses, testing of fresh

and hardened concrete, durability tests, concrete mix proportions and calculations related to test methods.

The state of the art laboratory of the I&A is accredited to perform 17 mechanical tests on fresh and hardened concrete and concrete aggregates. These tests include Air Content, Slump Test, Density and Temperature of Concrete, Flow Table Test, Setting Time, Water Bleeding, Compressive and Flexural Strength of Concrete, Water Permeability Test, Non Destructive Hammer Test and under aggregates, tests such as Sieve Analysis, Aggregate Impact and Aggregate Crushing Value, Specific Gravity, Los Angeles Test and Sand Moisture Test.

These accredited tests will provide accurate results in order to ensure the quality of production and the I&A's energetic workforce is always ready to provide their quality service to help the customers and thereby actively engage in the growth and development of the industry.



Holcim Innovation and Application Center

Valid until 26 December 2014
Issued on 27 December 2011

As an accredited laboratory, this laboratory is entitled to use the following accreditation symbol.



ISO/IEC: 17025
TL 037-01

Schedule of Accreditation

Accreditation Scheme for Testing Laboratories
Sri Lanka Accreditation Board for Conformity Assessment

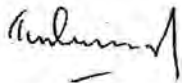
Accreditation Number: TL 037-01

Innovation and Application Center
Holcim (Lanka) Limited
873, Danister De Silva Mw, Colombo 14

Scope of Accreditation: Performing Mechanical Testing on the product group of Building Materials (Concrete & Aggregates)

SI NO.	Product(s) / Material of test	Specific tests performed	Test Method / Standard against which tests are performed	Range of testing/ Limits of detection	Uncertainty (±)
1	Fresh Concrete	Air Content	BSEN 12350-7:2009	1.0%-20.0%	0.2%
		Slump Test	BSEN 12350-2:2009	5.0mm -150.0mm	4.1mm
		Density of Concrete	BSEN 12350-6:2009	500.0 kg/m ³ – 3500.0 kg/m ³	16.6 kg/m ³
		Temperature of Concrete	ASTM C 1064-99	20.0 OC- 60.0 OC	0.5 OC
		Flow Table Test	BSEN 12350-5:2009	200.0mm-700.0mm	5.4mm
		Setting Time of Concrete	ASTM C403M	1.00hr-36.00hr	2.0 sec
		Water Bleeding of Concrete	ASTM C232	3.00ml-750.00ml	1.00 ml

SI NO.	Product(s) / Material of test	Specific tests performed	Test Method / Standard against which tests are performed	Range of testing/ Limits of detection	Uncertainty (±)
8	Hardened Concrete	Compressive Strength of Concrete	BSEN 12390-3:2009	200.0kN – 1800.0kN	0.2 Mpa
9		Flexural Strength of Concrete	BSEN 12390-5:2009	10.0kN – 200.0kN	0.2Mpa
10		Test for Water Permeability	DIN 1048	5.0mm - 200.0mm	1.5mm
11		Non destructive Hammer Test for Concrete	BSEN 12504-2:2001	10.0Mpa – 70.0Mpa	2.0Mpa
12	Aggregate	Sieve Analysis of Aggregate	BSEN 12620:2002 BSEN 932-1:1997	1.5 g – 15 x 10 ³ g	0.5 g
13		Determination of Aggregate Impact Value	BS812:112:1990	1.5 g – 15 x 10 ³ g	0.5 g
14		Determination of Aggregate Crushing Value	BS812:110:1990	1.5 g – 15 x 10 ³ g	0.5 g
15		Specific Gravity	ASTM C127- 88	1.5 g – 15 x 10 ³ g	0.5 g
16		Los Angeles Test	ASTM C131	1.5 g – 15 x 10 ³ g	0.5 g
17		Sand Moisture Test	BS182:109:1990	1.2 % - 10.0 %	0.4%



Director /CEO
Sri Lanka Accreditation Board for Conformity Assessment



Ayal Piyathilake
 Technical Manager – Geocycle
 Holcim (Lanka) Ltd.

Health and environmental effects of chemical exposure: An increasingly complex challenge

We proudly say that we are in an era where technology has reached unprecedented heights of development. However, this development is mainly human-centered. We consume more resources from the environment while we release more toxic waste back into the same environment. State of the art technologies, novel methods, different waste streams, new hazards and many new kinds of illnesses! Development that forgets the environment is heading towards disaster and this reminds us the great saying of Chief Seattle:



“Earth does not belong to us; we belong to earth. Humankind has not woven the web of life. We are but one thread within it. Whatever we do to the web, we do to ourselves. All things are bound together. All things connect.”

Environmental pollution through chemicals and chemical waste is a critical risk for the environment and for all species including humans. The release of chemicals continues to affect all aspects of natural resources including the atmosphere, water, soil and wildlife. Chemicals released into the air may act as pollutants or as greenhouse gases which lead to ozone depletion and also contribute to acid rain formation. These are the negative consequences we have to face because of what we have put into the atmosphere. Chemicals can contaminate water

sources through direct discharges into bodies of water or via the depositing of air contaminants in the water. This contamination can have adverse effects on aquatic plants and species, and even for the use or consumption of contaminated water.

When we consider soil, there are direct adverse results from atmospheric deposition, dumping of waste, spills from industrial or waste facilities, mining activities, contaminated water, or pesticides. The effects of soil contamination include loss of agricultural productivity, contamination of food crops grown on polluted soil, adverse effects on soil microorganisms, and human exposure either through food or through direct exposure to contaminated soil or dust.

Wildlife is badly affected by persistent and bio accumulative chemical contamination, mainly through the food chain. The increase of cancers, immune system dysfunction and reproductive disorders is one of the negative effects.

Though we set boundaries for ourselves, environmental pollution has no limitations. Pollution can occur in a faraway place, but the trans-boundary movement of chemicals may result in the effects being felt thousands of miles away. Chemical usage is associated with well-established risks to human health and the environment. Exposure to chemicals causes a broad range of effects from mild irritation to sudden death or severe damage to organs.

Workers in chemical industries are highly vulnerable to toxic chemical exposure and related health effects. For example, current studies show an increased cancer rate in workers in electronics facilities and high blood lead levels among workers at lead-acid battery manufacturing and recycling plants. Heavy metal exposure can cause deadly health impacts. Cadmium exposure is linked with reproduction problems because it affects sperm and reduces birth weight.

Lead poisoning is one of the most prevalent public health problems in many parts of the world. Mercury is toxic to a wide range of organisms, including humans, even at low concentrations. Humans can be exposed to nickel by inhalation, through water, smoking, or eating contaminated food. The intake of high quantities of nickel can cause cancer, respiratory failure, birth defects, allergies, and heart failure.

In addition, some halogenated organic compounds which have been identified as Persistent Organic Pollutants (POPs) play a deadly role in environmental pollution and lead to adverse health impacts. Some of these are aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, PCBs, and polychlorinated dibenzofurans (PCDD/PCDF).

Another deadly chemical category is Endocrine disruptors, which are chemicals that interfere with the endocrine in animals, including humans. These disruptions can cause cancerous tumors, birth defects, and other developmental disorders. Any system in the body controlled by hormones can be derailed by hormone disruptors such as drugs, pesticides, compounds used in the plastics industry and in consumer products, industrial by-products and pollutants, and even some naturally produced botanical chemicals. Some are pervasive and widely dispersed in the environment and may bio-accumulate. Some are persistent organic pollutants (POP's).

Recent toxicological research has revealed that for a range of chemicals even very low levels of exposure can increase the risk of disease and that both level and timing of exposure are important. Individuals living in poverty are particularly vulnerable, both because their exposure may be particularly high, and because poor nutrition and other risk factors can increase susceptibility to the ill effects. Due to their size, children are more vulnerable to even small doses of toxic chemicals compared to adults. Because their metabolic pathways are immature, children are also slower to detoxify and excrete many environmental chemicals and thus toxins may remain active in their bodies for longer periods of time.

Minimizing exposure, minimizing the risks, and safeguarding the environment are challenging. Protecting the environment safeguards us. We have to be more concerned than ever before, because tomorrow matters.....

Reference:

UNEP, 2012. Global chemical outlook.

<http://seattlestravels.com>

http://en.wikipedia.org/wiki/Endocrine_disruptor

http://en.wikipedia.org/wiki/Persistent_organic_pollutants



Randeewa Malalasooriya
Business Development Manager - Geocycle
Holcim (Lanka) Ltd.

Geocycle: A sustainable waste management solution

Waste: An ever growing issue

Waste is an ever growing issue since it is a key contributor to CO₂ emission which causes global warming, and it also affects air, water and soil quality. Therefore there is a clear need for environmentally sound solutions. Global warming and destruction of the environment are already taking place at a rapid rate. Leading scientists and governments tell us that we have a swiftly diminishing window of opportunity to reverse the damage caused. This situation is made worse by the fact that many view environmental issues as someone else's problem. It is generally thought that governments must take care of waste.

As a result of the lack of applicable technology and the failure to enforce proper procedures in Sri Lanka, industrial wastes generated during production and other processes is being added directly or indirectly to the municipal solid waste. Since most industrial waste is hazardous, this creates significant health, safety and environmental issues.

Geocycle Sri Lanka: Sustainable and responsible waste management solutions

In this context, Geocycle, the waste management arm of Holcim (Lanka) Limited, commenced its operations in 2003, thereby providing peace of mind to the industrial community in Sri Lanka through safe and reliable measures for disposing of industrial waste. These solutions are sustainable and leave no future environmental liabilities. More importantly, Geocycle is the one and only entity in Sri Lanka that has the capacity and capability to offer environmentally responsible waste management solutions to dispose of hazardous waste through a technique called "Co-processing".

Co-processing

Co-processing is a technique used for the thermal destruction of hazardous wastes. It is a combination of two processes undertaken simultaneously without compromising the efficiency of either. Co-processing meets all regulatory technical standards and is globally adopted for management of waste that is difficult to destroy. It is also superior to land filling and incineration, as it offers a complete solution with no residue.

Co-processing has been practiced with positive results in the USA, Japan and EU countries for the past 30 years. It is also recognized by several international organizations such as the World Health Organization (WHO), the GTZ, Basel Convention, Stockholm Convention, etc. Locally, it has been approved and is encouraged by the Ministry of Environment & Natural Resources, the Central Environmental Authority (CEA), and the Provincial Environmental Authority of the NW province.

Licenses, permits & Certifications

Geocycle works closely with all government authorities to ensure that all waste handled and the complete disposal of such waste is fully covered under the provisions of the current National Environmental Protection Act. Geocycle has also contributed to the development of co-processing guidelines for Sri Lanka. We have all the required permits to handle procedures from collection to transport, storage, pre-processing and co-processing of scheduled waste. Geocycle is certified with the integrated management standards of ISO 9001, ISO 14001 and OSHAS 18001. The analytical laboratory of Geocycle is also accredited with ISO 17025 certification by the Sri Lanka Accreditation Board for analytical testing.

Services offered

Geocycle manages waste streams in a sustainable way, enabling industries to grow without environmental liabilities, thereby evading pressure from authorities, pressure groups and communities. Collection, transportation, pre-processing and final disposal are the services offered by Geocycle. In addition, the analytical laboratory of Geocycle offers accurate and reliable analytical testing for waste and waste derived fuels. Waste audits and waste consultation are some other value additions a customer could expect from Geocycle.

Despite the fact that industries are different, it is inevitable that all industries will generate some quantity of waste. Therefore, responsible waste management can make a significant difference to the reputation of the industry as well as to the environment.

A member of the Holcim Group

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