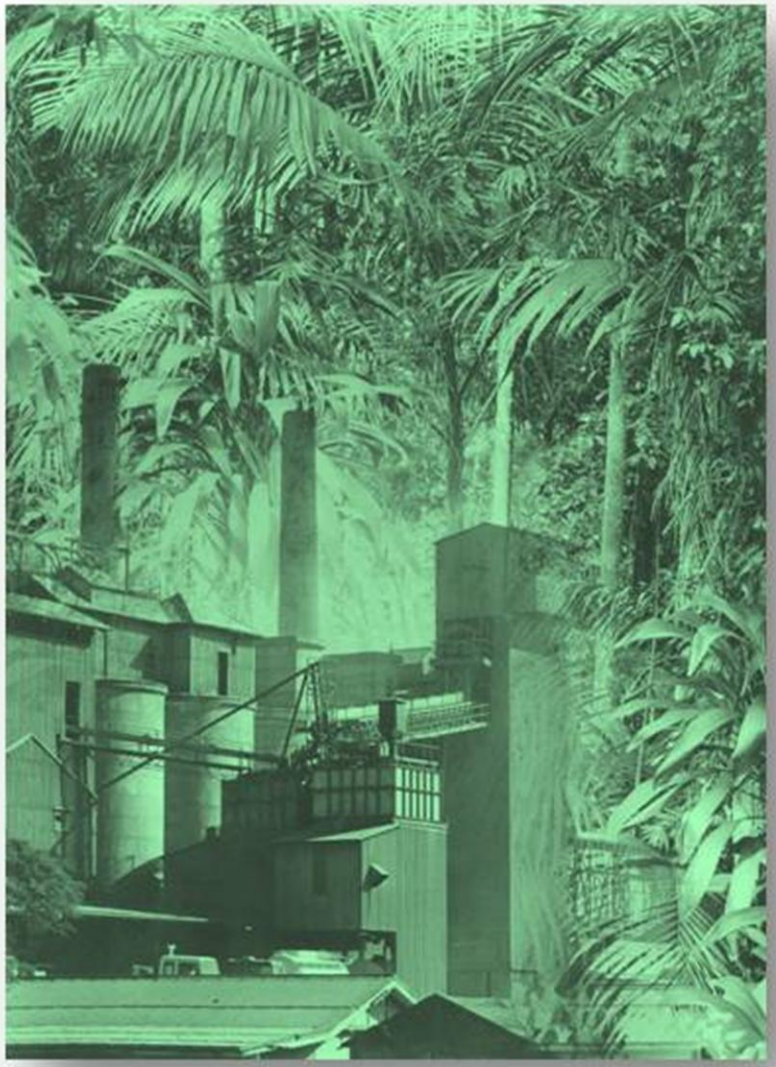


Preparing for Lima, December 2014 and the New Climate Agreement:

Adoption of Sustainable Development and Deep Decarbonization Initiatives as Innovations for Moving to a Low-Carbon Economy

Dr Ted Christie

22 September 2014

"We need a clear vision, anchored in domestic actions, for keeping temperature rise below 2 degrees Celsius".
UN Secretary-General, Ban Ki-moon (15 July 2014)

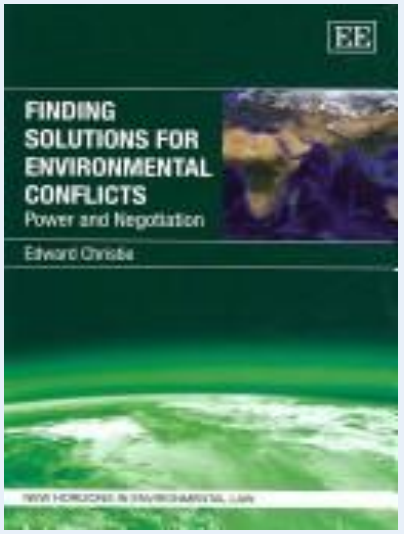
Summary

TAGS: Lima 2014; new climate agreement; United Nations; sustainable development; low-carbon economy; deep decarbonization; coal-generated energy; international trade in coal; innovations; diffusion and adoption; collective innovative decisions; consensus; influentials; CO_2 emissions; historical global temperature rise.

- ☑ **In 2013, the world's top seven countries that exported coal and the top seven countries that imported coal – together – contributed 63.7% of global CO_2 emissions.**
- ☑ **Eleven of these 14 countries were also in the "top 20" countries that contributed to the historical rise in global temperature from pre-industrial to 2005.**
- ☑ **The IPCC's Fifth Assessment Report(2014) notes that the "*Increased use of coal relative to other energy sources has reversed the longstanding trend of gradual decarbonisation of the world's energy supply".***
- ☑ **A UN Report (July 2014) – "*The Deep Decarbonization Pathways Project*" – outlines practical pathways for major emitting countries to cut their CO_2 emissions in moving to a low-carbon economy by 2050.**
- ☑ **The UN acknowledges that limiting global temperature rise to 2^0C below pre-industrial temperatures is critical to sustainable development.**
- ☑ **For coal-generated energy to become part of a new global norm for moving to a low-carbon, sustainable future, *Deep Decarbonization* requires a global commitment by countries involved in the international trade in coal to be influential in the adoption of low-carbon energy technology innovations.**
- ☑ ***Based on concepts for the diffusion and adoption of scientific innovations, a problem-solving based pathway is outlined for the uptake of global initiatives for moving to a low-carbon economy and for achieving sustainable development.***

The Author: *Dr Ted Christie*

Environmental Lawyer,
Mediator &
Environmental Scientist



Author of "Finding Solutions for Environmental Conflicts: Power and Negotiation" (2008, 2009), Edward Elgar Publ., Cheltenham, UK.

W. www.environment-adr.com
W. www.environeg.blogspot.com.au
E. ted.christie@bigpond.com
E. info@environment-adr.com
M. 61 7 414 408 604

(i) Dr Ted Christie has been involved in the climate change discussion since the early 1980s. Initially, as an Associate Professor (Applied Ecology), as an invited participant to a UNEP Workshop convened by the late Swedish climatologist, Dr Bert Bolin, at Stockholm.

(ii) As an environmental lawyer in the 1990s, articles were published in international law journals on science and regulatory control of carbon dioxide emissions to address climate change; also, legal liability for coastal town planners and environmental professionals for advice related to sea level rise and climate change.

(iii) In more recent years, as an *environmental dispute resolver*, a series of articles on climate change issues have been published on a number of web sites that focus on finding sustainable solutions for moving to a low carbon economy.

Introduction

Coal will remain the cheapest and most abundant fuel source on the planet and renewables will not and cannot replace fossil fuels any time soon: **Speech to Sydney Institute by US energy expert Robert Bryce (September 2014)**
http://www.abc.net.au/radionational/programs/breakfast/coal-to-remain-biggest-fuel-source-into-the-future-us-expert/5735630

i. **On 8 July 2014, the UN Secretary-General Ban Ki-moon announced the launch of *"Pathways to Deep Decarbonisation"*: A report that outlined country-specific initiatives for moving to a low-carbon economy to limit global temperature rise to less than 2^0C, pre-industrial.**

ii. **A legally binding Universal Climate Agreement is to be negotiated at Paris in December, 2015.**

iii. **The preliminary step is for UN Member States to negotiate and to draft the new Universal Climate Agreement at Lima in December, 2014.**

iv. **Following the UN Climate Change Conference at Warsaw in 2012, the new Climate Agreement will require UN Member States to prepare "contributions" to limit or reduce emissions. Contributions could be specific emission reduction targets - or other efforts and commitments to cut emissions.**

v. **Contributions made by each Member State to cut CO_2 emissions, in moving to a low-carbon economy, should adopt UN initiatives *"to help put the world on a more sustainable path".***

vi. ***One key challenge for Lima will be: International trade in coal - coal-fired energy – adoption of low-carbon energy technologies - sustainable development.***

vii. ***The adoption of UN initiatives for moving to a low-carbon economy, and to achieve sustainable development, can be based on concepts for the diffusion and adoption of scientific innovations.***

Contributions of UN Member States to Historical Global Temperature Rise

SOURCE: H Damon Matthews, Tanya Graham, Serge Keverian, Cassandra Lamontagne, Donny Seto and Trevor J Smith, '*National contributions to observed global warming*', **2014 Environ. Res. Lett. 1-9**
doi:10.1088/1748-9326/9/1/014010

- **The Table which follows (Slides 6, 7) is from a research study recently published by Matthews *et al.* (2014). National datasets for CO_2 emissions from fossil fuel use were used to calculate historical totals for each country up to, and including, the year 2005.**
- **Global temperature increased by about 0.7^0C over the study time period: *pre-industrial - 2005.***
- **The contributions to the historical rise in global temperature by the top 20 UN Member States varied significantly; the contributions are ranked in decreasing order in the Table.**
- **The United States is the clear leader in contributing to global warming since pre-industrial times: accounting for around 20% of the global temperature rise; next, in decreasing order of rank, are China, Russia and Brazil and India.**
- ***In this research study, the top seven ranking UN Member States account for about 63% of historical global warming; the top 20 account for around 82%.***

Contributions of UN Member States to Historical Global Temperature Rise *(Continued)*

UN Member State Rank	Contribution to Global Temperature Rise
1. United States	0.151^0C
2. China	0.063^0C
3. Russia	0.059^0C
4. Brazil	0.049^0C
5. India	0.047^0C
6. Germany	0.033^0C
7. United Kingdom	0.032^0C
8. France	0.016^0C
9. Indonesia	0.015^0C
10. Canada	0.013^0C

Contributions of UN Member States to Historical Global Temperature Rise *(Continued)*

UN Member State Rank	Contribution to Global Temperature Rise
11. Japan	0.013^0C
12. Mexico	0.010^0C
13. Thailand	0.009^0C
14. Columbia	0.009^0C
15. Argentina	0.009^0C
16. Poland	0.007^0C
17. Nigeria	0.007^0C
18. Venezuela	0.007^0C
19. Australia	0.006^0C
20. Netherlands	0.006^0C

Contributions of UN Member States to Historical Global Temperature Rise *(Continued)*

SOURCE: H Damon Matthews, Tanya Graham, Serge Keverian, Cassandra Lamontagne, Donny Seto and Trevor J Smith, '*National contributions to observed global warming*', **2014 Environ. Res. Lett. 1-9**
doi:10.1088/1748-9326/9/1/014010

(i) **The picture that emerges from this research study is one where - in general - developed countries and major emerging economy nations lead in the historical contribution to global warming through the burning of fossil fuels.**

(ii) **In contrast, for developing countries such as Brazil, Columbia, Venezuela , Indonesia and Nigeria, the dominant contribution to global warming has originated from land-use emissions - in their case, the deforestation of tropical forests.**

(iii) **NOTE: "Deforestation accounts for about 17%-18% of global anthropogenic GHG emissions".**

WEB LINK: http://www.ase.tufts.edu/gdae/education_materials/modules/REDD.pdf

(iv) **Re Historical Global Temperature Rise: Matthews *et al.* conclude that, "*while we have only considered emissions up to the end of 2005 for the sake of consistency across available emission datasets, we have reason to believe that including more recent emissions would not dramatically affect the ordering of countries given in* [our] *Table*…"**

WEB LINK: http://iopscience.iop.org/1748-9326/9/1/014010/pdf/1748-9326_9_1_014010.pdf

Moving to a Low-Carbon Economy:
International Trade in Coal and Global CO_2 Emissions

"The concept of 21st Century coal is about ensuring sustainability across the entire coal value chain."

The World Coal Association, 30 July 2014

- ☑ **In 2013, the world's top seven countries that exported coal- together with the top seven countries that imported coal – contributed 63.7% of global CO_2 emissions:-**
- ☑ **The top 7 countries that exported 1193 Mt of steam and coking coal contributed 26.9% of global CO_2 emissions: See Slide 10.**

  All seven countries are UN Member States; all have ratified the Kyoto Protocol.
- ☑ **The top 7 countries that imported 998 Mt of steam and coking coal contributed 36.8% of global CO_2 emissions: See Slide 11.**

  Taiwan is not a UN Member State. Of the remaining six UN Member States, all but Canada have continued to ratify the Kyoto Protocol. Canada exercised its legal right to formally withdraw from the Kyoto Protocol in December, 2011.

SOURCES:

i. http://www.worldcoal.org/resources/coal-statistics/

ii. http://www.statista.com/statistics/271748/the-largest-emitters-of-co2-in-the-world/

iii. 'Reducing Australia's Greenhouse Gas Emissions—Targets and Progress Review. Final Report '. February, 2014. *Australian Government Climate Change Authority.*

International Trade in Coal: Ranking of Top Coal Exporters in 2013

(Contribution to Global CO_2 Emissions of Each Exporter in 2013 is also shown)

COAL EXPORTER RANK	Share of (Steam + Coking) Coal Exports: 2013 *[Total 1193 Mt]*	*Contribution to Global Carbon Dioxide Emissions* (2013)
1. Indonesia	35.7%	*2.3%*
2. Australia	28.2%	*1.3%*
3. Russia	11.8%	*4.9%*
4. United States	9.0%	*15.5%*
5. Columbia	6.2%	.
6. South Africa	6.0%	*1.3%*
7. Canada	3.1%	*1.6%*
	100%	***Total: 26.9%***

International Trade in Coal: Ranking of Top Coal Importers in 2013

(Contribution to Global CO_2 Emissions of Each Importer in 2013 is also shown)

COAL IMPORTER RANK	Share of (Steam + Coking) Coal Exports: 2013 *[Total 998 Mt]*	*Contribution to Global Carbon Dioxide Emissions (2013)*
1. PR China	32.8%	*22.9%*
2. Japan	19.6%	*3.5%*
3. India	18.0%	*5.1%*
4. South Korea	12.6%	*1.8%*
5. Chinese Taipei (Taiwan)	6.8%	.
6. Germany	5.1%	*2.1%*
7. United Kingdom	5.1%	*1.4%*
	100%	***Total: 36.8%***

Sustainable Development

1. The Future of Coal as a Global Energy Source

"The increased use of coal relative to other energy sources has reversed the longstanding trend of gradual decarbonisation of the world's energy supply". **Fifth Assessment Report of the IPCC (2014)**

i. **The World Coal Association estimates that coal-fired power plants generate about 41% of the world's electricity; and that there are around 109 years of coal remaining worldwide.**

ii. **But, the Fifth Assessment Report of the IPCC (2014) notes "that [future] mitigation policy could devalue fossil fuel assets, and reduce revenues for fossil fuel exporters."**

iii. **The future of coal as part of the global energy mix is a classic problem for sustainable development:-**

- ***Deriving socio-economic benefits from strong, growing and diversified national economies through industrial growth and international trade in coal; with***
- ***Offsetting the immediate and long-term risks to the environment and climate change posed by international trade in coal.***

iv. **Conflict over the future use of coal as an energy source has the potential to be a "log in the road" for moving to a low-carbon economy, and sustainable development, in negotiations over the draft of the new Climate Agreement at Lima later this year.**

Sustainable Development

2. Mitigation Measures and Global Temperature Rise

"Climate change and sustainable development are interdependent and mutually supporting."

UN Secretary-General Ban Ki-moon, January, 2014

i. **Mitigation is a human intervention to reduce the sources or enhance the sinks of GHGs. Mitigation, together with adaptation to climate change, contributes to the objective expressed in Article 2 of the UNFCCC "*...to enable economic development to proceed in a sustainable manner.*"**

ii. **Keeping temperature rise caused by GHG emissions derived from human activities below 2 °C, relative to pre-industrial levels, will most likely require atmospheric CO_2 concentrations of about 450 ppm by 2100; and**

iii. **"Scenarios reaching atmospheric concentration levels of about 450 ppm CO_2 by 2100 (consistent with a likely chance to keep temperature change below 2°C relative to pre-industrial levels) include substantial cuts in anthropogenic GHG emissions by mid-century through large-scale changes in energy systems and potentially land use ... Scenarios reaching these concentrations by 2100 are characterized by lower global GHG emissions in 2050 than in 2010, 40 % to 70 % lower globally"…**

SOURCE: **Fifth Assessment Report of the IPCC (2014)**

Sustainable Development

3. A Scientific Innovation for Addressing Climate Change

"Climate change is the single greatest threat to sustainable development. Yet, too often, one important fact gets lost amid the fear: addressing climate change is one of our greatest opportunities".

UN Secretary-General, Ban Ki-moon, October 2013

- ☑ **A scientific innovation to address climate change refers to a new idea or practice that has not been adopted or accepted - rather than the creation of the idea or practice itself. It involves a perception for the need to take a different approach to address climate change.**
- ☑ **Sustainable development, as a scientific concept, is not a new idea or practice.**
- ☑ **Its origin is the 'Brundtland Report' ("Our Common Future"), produced in 1987 by the United Nations World Commission on Environment and Development.**
- ☑ **At the Earth Summit held in Rio de Janerio in 1992 (*the United Nations Conference on Environment and Development),* 178 countries endorsed the *Rio Declaration on Environment and Development.* It set out 27 legally non-binding principles for countries to base actions to deal with sustainable development.**
- ☑ **Agenda 21 also emerged from the Earth Summit. It provided a future global plan of action for sustainable development. It was based, to a large extent, on the Rio Declaration principles.**

Sustainable Development 1. A Scientific Innovation for Addressing Climate Change *(Continued)*

- ☑ **Commencing with its international climate change treaties, the UN has long recognized that achieving sustainable development was crucial for addressing climate change.**

  SEE: *Article 2*, UNFCCC, (1992) and *Article 2,* Kyoto Protocol (1997).

- ☑ **In May 2014, a Draft Resolution of the Organization of American States (OAS) agreed:**

  "To continue and to strengthen efforts made within the General Secretariat of the OAS to support Member States towards the achievements of commitments made in the area of sustainable development and climate change to counter the adverse effects of climate change".

  WEB LINK: http://scm.oas.org/doc_public/ENGLISH/HIST_14/CIDRP00820E02.doc

- ☑ **In launching the *"Sustainable Development Solutions Network Deep Decarbonization Pathway Project Report"* on 8 July 2014, the UN Secretary-General, Ban Ki-moon remarked:**

- ***Limiting global temperature rise was critical to sustainable development;***
- ***Deep decarbonization required global commitment to advance key low-carbon energy technologies; and***
- ***Practical problem-solving was needed to tackle climate change and achieve sustainable development.***

WEB LINK: http://www.un.org/sg/offthecuff/index.asp?nid=3472

Diffusion and Adoption of Innovations

1. Sustainable Development and Climate Change as a Case Study

Clean energy transformation to help put the world on a more sustainable path will require innovation, investment and collaboration by all partners. **UN Secretary-General, Ban Ki-moon, October 2013**

- ☑ **Clearly the concept of sustainable development is not a new idea or practice to address climate change or for moving to a low-carbon economy.**
- ☑ ***Diffusion*** **(or "spread") of the concept of sustainable development is not in issue. It has been effectively communicated, over time, by the UN - as well as through the series of Assessment Reports prepared by the IPCC.**
- ☑ **Rather, the problem is the *extent and rate of adoption of sustainable development* by UN Member States. Global commitments to adopt sustainable development need to to be more widely taken up, or advanced, in country-specific initiatives to cut CO_2 emissions.**
- ☑ **The book, *Diffusion of Innovations* by Professor Everett Rogers, first published in 1962 (*and now in its 5th edition)*, is regarded as a classic work on understanding the concepts for the diffusion and adoption of innovations:** **See Slides 17, 18.**

Diffusion and Adoption of Scientific Innovations:
2. Accepted Principles and Concepts

i. **Following Rogers, Steven Kelly (2012) has published an updated, detailed Research Report titled, *"Literature Review on the Diffusion of Innovations and Best Practice for Technology Transfer":-***

WEB LINK: http://haifa.esr.cri.nz/assets/Uploads/Docs/Technology-Transfer-Literature-Review.pdf

ii. **This Research Report reviewed the following key criteria of Rogers because of their potential impact on the rate of adoption of innovations:-**

- **RELATIVE ADVANTAGE: Does the innovation have a clear advantage over the idea it supersedes or competing innovations - either in terms of being effective, or cost-effective? Expert opinion suggests that relative advantage is an essential condition absolutely necessary for adoption.**
- **COMPATIBILITY: Innovations that are compatible with intended Adopters' values, norms, and perceived needs are more likely to be readily taken up and to have a significant impact on the adoption decision.**

Diffusion and Adoption of Scientific Innovations: 2. Accepted Principles and Concepts *(Continued)*

- **COMPLEXITY:** An innovation which is perceived as easy to understand, and to use, is more likely to be adopted.
- **TRIALABILITY:** New ideas that can be trialled before adoption are more likely to be taken up.
- **OBSERVABILITY:** The degree to which the use and benefits of the innovation can be observed, and be visible to others, acts as a further stimulus for adoption.
- **REINVENTION:** The ability to adapt, refine or modify an innovation to suit the specific use needs of Adopters will allow it to be more easily adopted.
- **RISK:** If there is a high degree of uncertainty in the outcome of the innovation - or a perception of risk – the innovation is less likely to be adopted.

☑ **These concepts justify consideration at Lima, 2014: They are objective criteria that can be applied to practical problem-solving on the potential for the adoption of global initiatives for achieving sustainable development that tackle climate change.**

Practical Problem-solving: Climate Change and Sustainable Development
1. Collective Innovation Decision-Making at Lima 2014

a. **Currently, there are 192 Parties (*191 States and the European Union*) that have ratified the Kyoto Protocol to the UNFCCC: Multi-parties will be involved in negotiating the Draft of the new Universal Climate Agreement at Lima in December 2014.**

b. **In these circumstances, negotiating contributions for moving to a low-carbon economy that promote sustainable development will need to rely on "collective innovation decisions".**

c. **A collective innovation decision is one where choices are made to adopt or reject an innovation. *The decision is a collective one as it is made by "consensus" by the multi-parties*.**

d. **The alternative to a unanimous agreement is consensual agreement. The goal of consensus decision-making is to encourage joint problem-solving.**

- **The generally accepted meaning for consensus is reaching a decision that all parties can live and abide *with (Pritzker, 1995).***
- ***Consensus does not mean total agreement on every part of a decision, but all parties must be willing to accept the overall option for mutual gain.***

Practical Problem-solving: Climate Change and Sustainable Development
2. Consensus Decision-making & Deep Decarbonization Negotiations

- ☑ **Having consensus as the basis for collective decision-making - together with the use of objective criteria to assess initiatives for Deep Decarbonization in terms of their potential for adoption - are cornerstones for practical problem-solving.**
- ☑ **Sustainable development is also a cornerstone for decision-making over Deep Decarbonization.**
- ☑ **Co-operation is an essential condition for enhancing the rate of innovation adoption. It needs to be recognized that efforts to facilitate, or strengthen co-operation by UN Member States could also lead to a more effective process for adopting innovations where collective decisions must be made by multi-parties.**

  SEE: http://ec.europa.eu/economy_finance/publications/publication_summary15824_en.htm
- ☑ **One practical problem that could be addressed at Lima later this year, would be to assess country-specific initiatives to tackle climate change contained in the *"The Deep Decarbonization Pathways Report*" (June 2014): Specifically, how to effectively gain adoption of innovations for moving to a low-carbon economy and for achieving sustainable development?**

  WEB LINK: http://unsdsn.org/news/2014/07/08/ddpp-press-release/

Practical Problem-solving: Climate Change and Sustainable Development
3. The Role of Influentials on the Adoption of Innovations

- The data and information upon which climate change is based on is heavily founded on scientific, statistical and mathematical materials that have become increasingly sophisticated.
- Contrary to a long-held misconception, science does not generate exact knowledge with logical certainty. Divergent scientific opinion on any issue will always exist.
- So, it is not surprising that the mere dissemination of scientific facts on climate change will not necessarily result in the adoption of an innovation. Scientific communication and adoption of innovations can be confounded by perceptions of risk, scientific uncertainty, as well as values and public trust and confidence in the science.
- To offset this problem and to effectively gain adoption of a new innovation, the practical need is to identify "i*nfluentials*" (also referred to as *"key players"* or *"opinion leaders")* who could facilitate the rate of adoption of an innovation i.e. by influencing others by spreading positive information that desirable results can be realized by uptake of the innovation.
- But, how can we identify UN Member States who would be "*influential"* in fulfilling this role for climate change innovations?

Practical Problem-solving: Climate Change and Sustainable Development
4. Identifying Influentials for the Adoption of Innovations

- ❖ **In taking global action for climate change under the UNFCCC and Kyoto Protocol, the UN was guided by a feature of international law: the principle of '*common but differentiated responsibilities.*'**
- ❖ **The principle of common but differentiated responsibility includes two fundamental elements:**

i. **The common responsibility of States for the protection of the environment, or parts of it, at the national, regional and global levels; and**

ii. **The need to take into account the different circumstances, particularly each State's contribution to global temperature rise and its ability to prevent, reduce and control the threat - including differences in a country's economic capacity or capability to take action.**

WEB LINK: http://cisdl.org/public/docs/news/brief_common.pdf

- ☑ ***Applying the second element of this principle, UN Member States could be indentified to fulfil the role of "influentials" and have a key role in the adoption of climate change innovations. The appropriate UN Member States could be found by evaluating the link between international trade in coal with the historical rise in global temperature.***

Practical Problem-solving: Climate Change and Sustainable Development
4. Identifying Influentials for the Adoption of Innovations (Continued)

i. **Six of the world's top seven countries that exported coal - *Indonesia, Australia, Russia, United States, Columbia and Canada* – are also among the top 20 UN Member States that have contributed to the historical rise in global temperature: See Slides 6,7 and 10.**

ii. **Five of the world's top seven countries that imported coal – *China, India, Germany, United Kingdom and Japan* – are also among the top 20 UN Member States that have contributed to the historical rise in global temperature: See Slides 6, 7 and 11.**

iii. **These 11 UN Member States have all received significant benefits to their national economies through the international trade in coal.**

iv. ***But, all of these 11 UN Member States are major contributors to the historical rise in global temperature - either as major emitters of CO_2 or deforestation practices: The economic benefits they have received from the international trade in coal have been associated with the potential for negative impacts on the global environment and disproportionate costs to other States.***

Practical Problem-solving: Climate Change and Sustainable Development

5. Conclusions

"Deep decarbonization is feasible, but it requires global commitment to advancing key low-carbon energy technologies."

UN Secretary-General Ban Ki-moon, January, 2014

i. **A challenge for these UN Member States: Australia, Canada, China, Columbia, India, Indonesia, Japan, Russia and USA – as well as Germany and the UK (*or possibly the EU as a regional economic integration organization to the Kyoto Protocol*) - is to each accept the key role as an "*influential UN Member State*" for the adoption of country-specific climate change innovations.**

ii. **In this regard each of these State's present position may be assessed using the "adopter categories" defined by Everett Rogers; the "playing field" is certainly not level. For example:**

- **The EU could be seen as an "e*arly adopter*" as having the highest degree of influence among the adopter categories. A reasonable and prudent choice of mitigation measures by the EU has been adopted, enabling a central position for the diffusion of innovations to be maintained.**
- **China and the USA could be seen as part of the "e*arly majority*". Innovations have been adopted over time – but this has taken longer compared to the early adopters.**
- **Recent directions taken by Australia for climate change suggest that it may run the possible risk of now being seen as part of the *"late majority"*. To offset this, the existing position should avoid any perception of skepticism in adopting some innovations.**

Practical Problem-solving: Climate Change and Sustainable Development *5. Conclusions (Continued)*

(iii) **Moving to a low-carbon economy requires shared vision from all UN Member States. The challenge is to take up the opportunity identified by UN Secretary-General Ban Ki-moon: The "*need* [for] *bold and decisive action to ensure that climate change does not undermine efforts to eradicate poverty and promote sustainable development* (July 2014)".**

(iv) **One foundation for taking up this challenge lies with the 11 UN Member States identified under the principle of '*common but differentiated responsibilities';* the role of "influentials" would be to facilitate the extent and rate of adoption of country-specific climate change innovations for moving to a low-carbon economy, sustainably.**

(v) **An essential condition for the "influentials" to be effective would be to share a common adopter category – "early adopter". In taking up such a role to tackle the global problem of climate change and sustainable development, their trustworthiness, international standing, influence, prestige and good reputation, as a UN Member State, would be enhanced.**

References and Further Reading

References:

IP*CC* Fifth Assessment Report: Climate Change (2014) '*Impacts, Adaptation and Vulnerability.*'

IPCC Fifth Assessment Report: Climate Change (2014) '*Mitigation of Climate Change.*'

Pritzker, DM (1995), 'Regulation by consensus: negotiated rulemaking in the United States', *Commercial Dispute Resolution*, 1, 217.

Rogers, Everett M (2003), 'Diffusion of Innovations' (5th Edition), New York: Free Press.

Related articles on this topic By Dr Ted Christie:

(i) "Understanding Climate Change & Sustainable Development in a Nutshell"
(Posted 20 March 2014)
http://www.environment-adr.com/uploads/ClimateChange-SD-Nutshell.Lima2014.pdf

(ii) "A Roadmap for the Universal Climate Agreement, Lima, December 2014: Negotiating a sustainable solution for moving to a low-carbon global economy based on conflict resolution & scientific concepts"
(Posted 20 March 2014)
http://www.environment-adr.com/uploads/Lima-Peru.2014-NewClimateAgreement.pdf

(iii) "Beyond Kyoto: The future of coal" *(Posted 02 April 2013)*
http://www.independentaustralia.net/environment/environment-display/beyond-kyoto-the-future-of-coal,5173