

13th UIC Sustainability Conference



Recent Progress and Challenges in Recyclability of Rolling Stocks

Zac - Sakdirat Kaewunruen PhD MBA CPEng FHEA

The University of Birmingham



12, 13, 14 October 2016

Introduction



- Large amount of trains have reached the end of their service life.
- This has raised significant concerns from train operators and the expectation from the public whether a train or rolling stock can be sustainably, environment-friendly designed over its life cycle.



ISO TC269/WG4



- UIC (Dr Cheul Kyu Lee, KRRI) has initiated the ISO TC269 WG4 to develop a method for calculation of recyclability and recoverability rate of rolling stock.
- Predominantly, the method is aimed for new rolling stock at bidding stage (but it could be applied for other pertinent cases).



ISO TC269/WG4

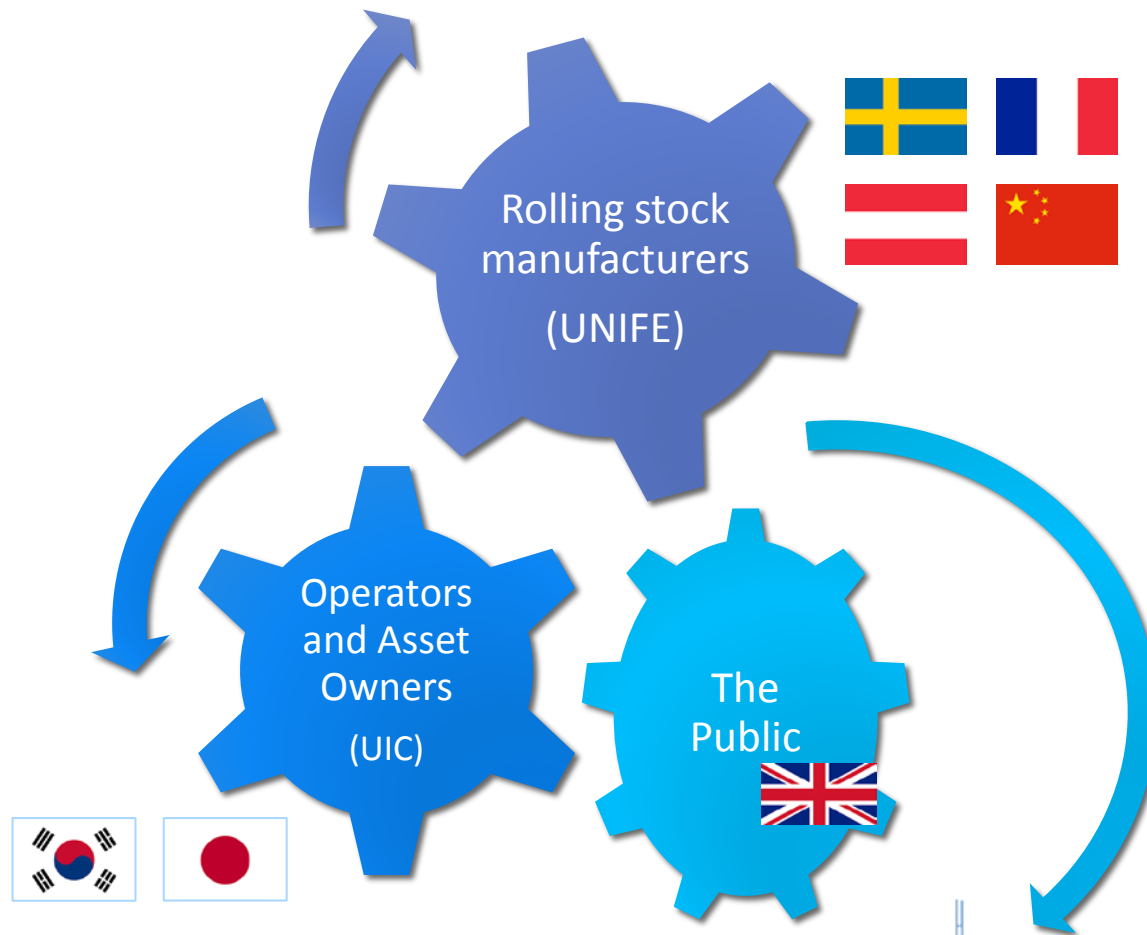


In Vienna

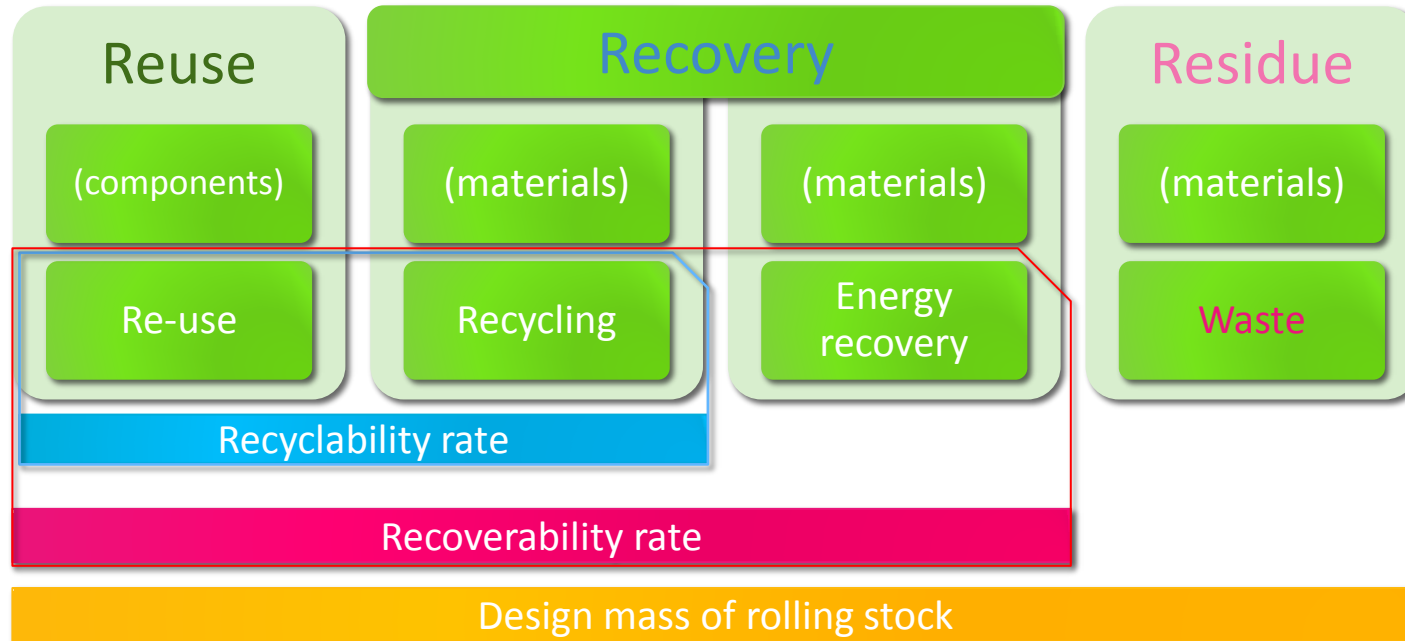
During the recent
committee meeting
between 10 and 11
October 2016



ISO TC269/WG4



Overview



- Draft ISO standard for Recyclability and recoverability calculation method of rolling stock ver 4.0 has been completed (60-80%).
- Further work for the draft ver 5.0 is currently being carried out for finalisation in December 2016.



Challenges



- **Theory vs Reality**

- Recyclability is the 'potential' of materials to be possibly recycled, whilst true ability to recycle materials varies from a country to the other.
- This ISO standard aims to calculate the theoretical 'potential'.

- **Trade-off values**

- To achieve high recyclability rate, rolling stock design may trade off other benefits such as light weight, energy efficiency, driving pattern, comfort, etc.).

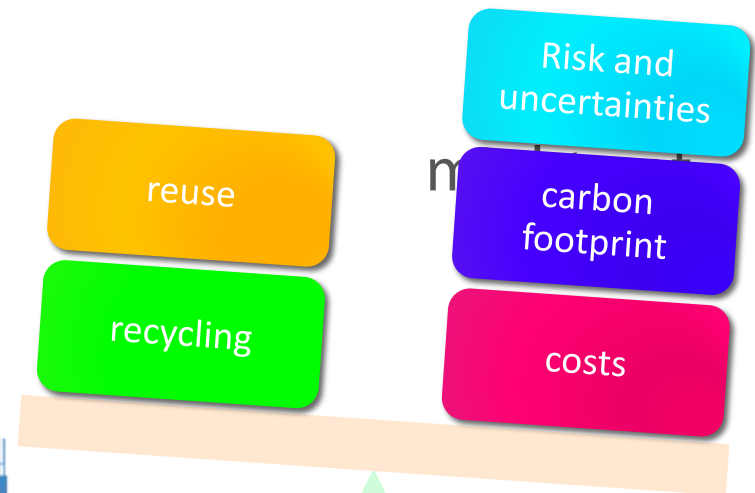


Challenges



- **Risk vs Values**

- Optimisation and balance of economic and carbon cost might discourage the recycling of rolling stock.
- Hazards from using recycled materials over a long term could increase risk level.
- Public support could not be
- Any given factor for calculation be able to apply to of materials.



Challenges



- **Inadequate Information**

- Irrelevant data might mislead the calculation results if upper bound estimation is conducted.
- Can the material data today be applied to the materials manufactured 30-50 years ago?
- Is there a need to optimistically harmonise data or process between developed and developing countries?
- How can we encourage **more research** into recycling of new materials for rolling stocks such as composites, etc.?
- How to encourage **open-access publications** in railway sector?



Speakers



- Applying EcoDesign guidelines when designing rolling stock in relation to recovery rate
 - [Dr Ulrika Överstam](#), Bombardier Transportation
 - Ulrika has over 10 years' experience of working in industries with questions related to chemistry, chemical compliance, recycling of products, life cycle assessments and environmental product declarations. Ulrika is involved in various delivery projects collaborating with customers, suppliers and internal functions in questions related to fulfilling EcoDesign and HSE requirements on rolling stocks produced by Bombardier. Ulrika also works with standardization both national and international within the fields of environmental management and recycling of rolling stock but also within Bombardier towards having one way of working with EcoDesign.



Speakers



- **Thomas GARNIER-DE-FALLETANS**, ALSTOM
- Mechanical Engineer by training, specialised in eco-design, Thomas is responsible for eco-design activity in ALSTOM Reichshoffen site (France) since 2009. Thanks to ambitious projects and ALSTOM policy he develops his expertise in a dynamic engineering department with convincing result on French regional train called "REGIOLIS". EPD published for "CORADIA Polyvalent" range shows its environmental performance and the quality of eco-design studies. His second activity in fire safety provides him a wide vision on train design especially choice of materials.



Speakers



- Features of rolling stock recycling technology in Japan
- **Dr. Kazuyuki Handa** is a senior researcher in the field of materials technology at Railway Technical Research Institute, Japan. He has been involved in many research and development projects related to railway wheels, brakes and their boundary problems for about 15 years. In association with research and development of materials for railway application he has many experiences also on environmental aspects and recycling matters.
- Dr. Handa is currently an international expert from Japan in ISO's recyclability and recoverability of rolling stock working group.



Speakers



- **Dr Cheul-Kyu Lee**, holding PhD with a major in environmental engineering based on Eco-design with Life Cycle Assessment. Since 2002, he is working as a senior researcher at the transportation environment research team in Korea Railroad Research Institute (KRRRI).
- Over the last 15 years, he has been performed several projects related to the life-cycle assessment in railway industry; the environmental performance declaration of rolling stock, the carbon footprint of railway infrastructure, the GHG management of railway industry and environmentally friendly recycling method in Korea. Also, he is managing ISO working group for recyclability of rolling stock with eminent experts from Europe and Asia. He is working at sustainable development unit in UIC from 2015.

