NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

Climate Change Challenge - Decarbonization 应对气候变化 – 减碳

Transportation Research Board Welcome 美国交通运输研究会 欢迎致辞

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Welcome from TRB in the United States!
美国交通运输研究会欢迎大家！

- The Transportation Research Board (TRB) is pleased to be a co-sponsor of the Climate Change Challenges (CCC) International Transport Webinars
- 美国交通运输研究会（TRB）很高兴成为应对气候变化（CCC）国际交通研讨会的共同主办单位
- Thank you to Mr. Mengyong Weng, Mr. Wenjie Liu, Ms. Nina Guan, and their colleagues at CHTS for working with TRB on this informative series of webinars
- 感谢翁孟勇理事长，刘文杰秘书长，管妮娜主任，及中国公路学会的各位同事跟TRB一道筹办这一系列内容丰富的研讨会
- Thank you to Mr. Christos Xenophontos and Ms. Caroline Alméras for their leadership from TRB and to Dr. Daniel Sperling for being TRB's keynote speaker.
- 感谢Christos Xenophontos先生， Caroline Alméras 女士代表TRB参与研讨会的组织，也感谢Daniel Sperling博士代表TRB作主旨报告。

International Knowledge Sharing
共享国际智慧

- CHTS-TRB Memorandum of Understanding
- 中国公路学会-美国交通运输研究会签署合作谅解备忘录
- Speakers at each other's conferences on current subjects
- 为双方会议推荐专家，共讨当下议题
- Mobility Management Meeting (MMM) webinars 交通出行服务（MMM）国际论坛
- CHTS is on TRB's International Coordination Council
- 中国公路学会作为TRB国际协调理事会的一份子
- Identification and discussion of critical issues to help inform research and policy agendas
- 共同确定并讨论为研究和政策制定提供咨询的关键问题
- Sharing of latest research and deployment results 共享最新研究和实践成果
- Encouragement of participation in each other's events 更积极地参与彼此活动
- Knowledge sharing in an objective professional setting 专业的、客观的知识共享

The Climate Change Challenge
气候变化

- Although it varies by nation, transportation contributes about ¼ of anthropogenic greenhouse gas emissions worldwide.
- 尽管各国的情况有所不同，但交通造成的温室气体排放约占全球人为温室气体排放的¼。
- Without changing our current trends and policies, baseline emissions from transportation are projected to result in a 60-75% increase in CO_2 emissions by 2050 from 2020 levels (varies by source of information).
- 在不改变我们目前的趋势和政策的情况下，预计到2050年，交通运输的基线排放将导致二氧化碳排放量在2020年的水平上增加60-75%(因信息来源而异)。
- If transportation contributes its fair share towards keeping global warming below 1.5°C, it will need to reduce CO_2 emissions by 78% from 2020 levels and 88% from projected 2050 baseline levels. Source: International Council on Clean Transportation
- 如果要让交通运输为全球变暖控制1.5 °C以下做出贡献，它将需要在2020年的水平上减少78%的二氧化碳排放，在2050年的预计基线水平上减少88%。资料来源:国际清洁运输理事会

The Climate Change Challenge
气候变化

- The International Council on Clean Transportation estimates that worldwide in 2020, 43% of CO_2 emissions came from light duty vehicles & 2 and 3 wheelers; 34% from heavy duty vehicles & buses, 11% from marine, 10% from aviation, and 2% from rail.
- 国际清洁交通委员会估计，到2020年，全球43%的二氧化碳排放来自轻型汽车& 2轮和3轮汽车;34%来自重型车辆和公共汽车，11%来自海运，10%来自航空，2%来自铁路。
- If we are going address the causes of climate change, we must find ways to decarbonize the entire transport sector.
- 如果我们要解决气候变化，我们必须找到让整个交通部门脱碳的方法。
- Our strategies will need to focus as much on freight and aviation as on surface passenger travel.
- 我们的战略既要关注地面客运，也要关注货运和航空。
- This is a global issue that will require a global approach to addressing the problem.
- 这是一个全球性问题，需要采取全球性办法来解决这个问题。

The Climate Change Challenge
气候变化

- According to ICCT, 90% of the growth in CO_2 emissions between now and 2050 is projected to occur in China, the Asia Pacific region, India, and Africa, driven almost entirely by increased travel demand.
- 根据ICCT的预测，从现在到2050年，90%的二氧化碳排放增长将发生在中国、亚太地区、印度和非洲，几乎完全由出行需求的增长驱动。
- The challenge is to reduce emissions without impacting economic growth in these parts of the world.
- 我们面临的挑战是在不影响这些地区经济增长的情况下减少排放
- At the same time, North America and Europe will need to reduce emissions from existing levels by significant amounts.
- 与此同时，北美和欧洲将需要在现有水平上大幅减少排放。
- **This will be a daunting challenge that will require an international commitment by policy makers and the public!**
- **这将是一项艰巨的挑战，需要决策者和公众的国际承诺!**

Strategies to Reduce GHG Emissions
减少温室气体排放的策略

- Conversion of the vehicular fleet to zero emission vehicles 将车辆转为零排放车辆
- Emission reductions in remaining internal combustion (ICE) vehicles
- 减少内燃机(ICE)车辆的排放
- Policies to reduce travel demand 减少出行需求的政策
- Electricity generation from renewable sources 可再生能源发电
- Taxing and pricing policies 税收和价格政策
- Use of alternative modes of transportation 使用其他运输方式
- Telecommunications as a substitute for travel 电信作为旅行的替代品

Although all of the above will need to be pursued, the vast majority of reductions will need to come from vehicular emissions reductions, i.e. decarbonization of the vehicle fleet.

虽然以上所有的目标都需要实现，但绝大多数的减排将需要来自于车辆减排，即车辆的脱碳。

Decarbonization Challenges
减碳挑战

- Conversion from manufacturing internal combustion engines (ICE) vehicles to electric vehicles (EVs) 车辆向电动化转变
- Changing consumer demand to want to buy electric vehicles 改变消费者需求
  - Overcoming range anxiety 克服续航焦虑
  - Initial costs are still higher for Evs 居高不下的初始成本
- Battery technology challenges 电池技术难题
  - Increasing battery capacity without increasing weight 增大容量时如何维持重量
  - Increasing the range of electric vehicle batteries 增加电动汽车电池的使用范围
  - Supply of materials for batteries (especially rare earth materials) 电池材料供应（特别是稀土材料）
  - Recycling of used batteries 废旧电池的回收

Decarbonization Challenges
减碳挑战

- Vehicle charging infrastructure 充电基础设施
  - Providing charging stations in locations where market demand is low 充电站点的选择
  - Fast charging infrastructure 快速充电
- Capacity of electric grid 电网容量
- Conversion of electricity generation to renewable sources 发电向可再生能源靠拢
- Economic impacts 经济影响
  - Impacts to supply chain for ICE vehicles 影响传统汽车供应
  - Impacts to repair and maintenance service and parts providers 影响维修、维护、零部件供应
  - Impacts to service stations 影响服务站

Decarbonization Challenges
减碳挑战

- Fleet turnover challenges 车辆周转率
  - ICE vehicles will be the majority for many years to come 未来传统能源汽车仍将占据主流
  - How can we reduce emissions of the existing fleet? 如今的车辆构成如何减排?
- Goods movement 货物运输
  - Battery technology is insufficient to generate power needed for long distances; major advances needed in clean propulsion power 电池不足以支持长途运输；清洁能源动力需要重大进展
  - Future of hydrogen as principal energy source to replace diesel 氢能作为主要能源的未来
- Aviation 航空
  - Sustainable aviation fuel 可持续燃料
  - Modal diversion of short trips 短途旅行有更多选择

Collaboration Is Critical
合作的重要性

- Decarbonization is a global challenge that will require all nations to be working together to address.
- 脱碳是一项全球性挑战，需要所有国家共同努力解决。
- There are many issues and challenges that require us to collaborate. 许多问题和挑战需要合作。
- We can and must learn from each other about research and deployment results, lessons learned, and future challenges.
- 我们能够，而且必须在研究和部署成果、经验教训和未来挑战方面相互学习。
- This applies to both technical and policy issues.
- 技术问题和政策议题均是如此。
- We have a daunting challenge that we must solve together, and we need to be collaborating on the full range of issues associated with decarbonization!
- 要共同解决这个艰巨的挑战，我们需要在与脱碳相关的所有问题上进行合作!

Transportation Research Board

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- Sign up for the TRB weekly e-newsletter 订阅每周时讯
- Become involved as a Friend of a TRB Committee: 加入委员会 www.MyTRB.org
- TRB TRID database: 数据库 www.trid.trb.org
- TRB Annual Meeting, Washington, DC, Jan. 8-12, 2023
- 2023年TRB年会：1月8日至12日，美国华盛顿

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