Road Infrastructure: Why Measure, What to Measure and How to Measure?

IRF Experience with Changer

Bringing Together Policy and Practice

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Transportation leadership you can trust.

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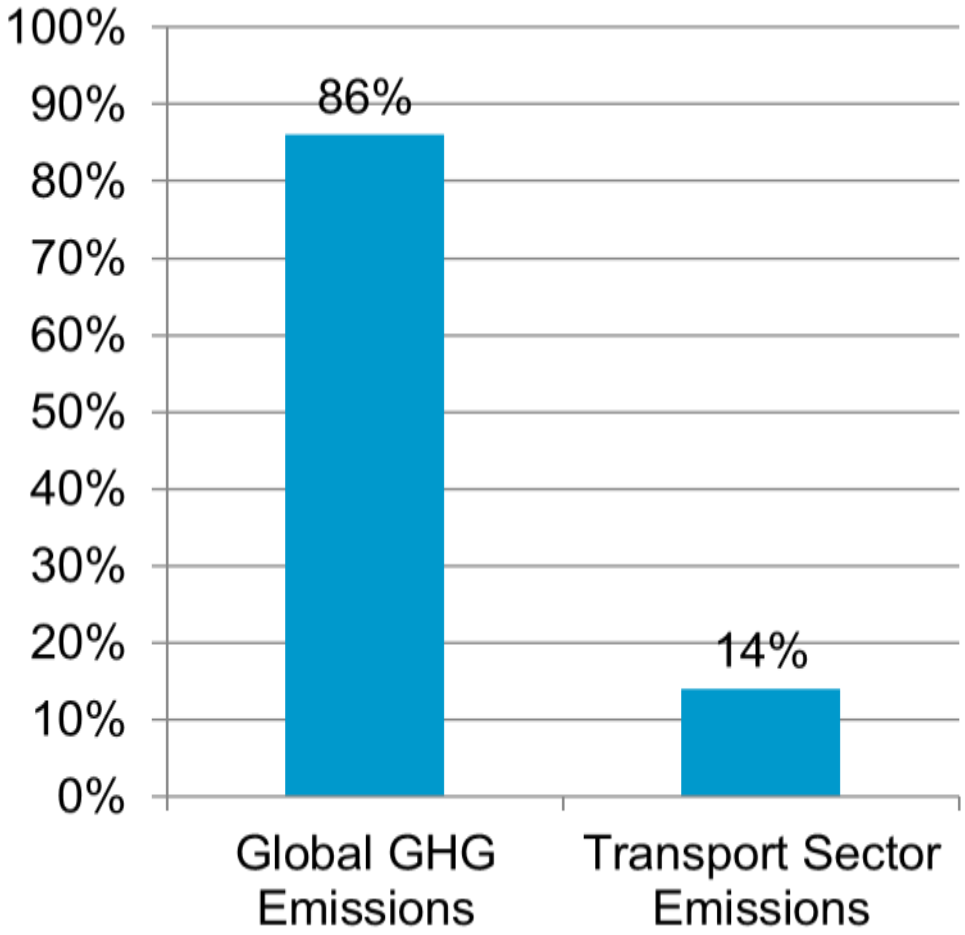
Outline

- Why measure emissions?
- Understanding emissions from road construction
- Tools for estimating emissions from road building
- Challenges in measuring emissions
- The way forward

Transport Contributes 14% of all Emissions



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Road Sector is Responsible for Large Share of Emissions from Transport Sector

	Mt eq. CO2 GHG Emissions 2005			
	Total	Transport	%	Road
World	38725	5378	14%	72%
Asia	14236	1098	8%	95-100%
Europe	8141	1244	15%	93%
North America	7834	1973	25%	85%
Central American and Caribbean	773	161	21%	N.A.
MENA	2566	388	15%	N.A.
South Africa	2124	286	14%	>50%
Sub-Saharan Africa	1083	104	10%	N.A.
Oceania	647	93	14%	84%

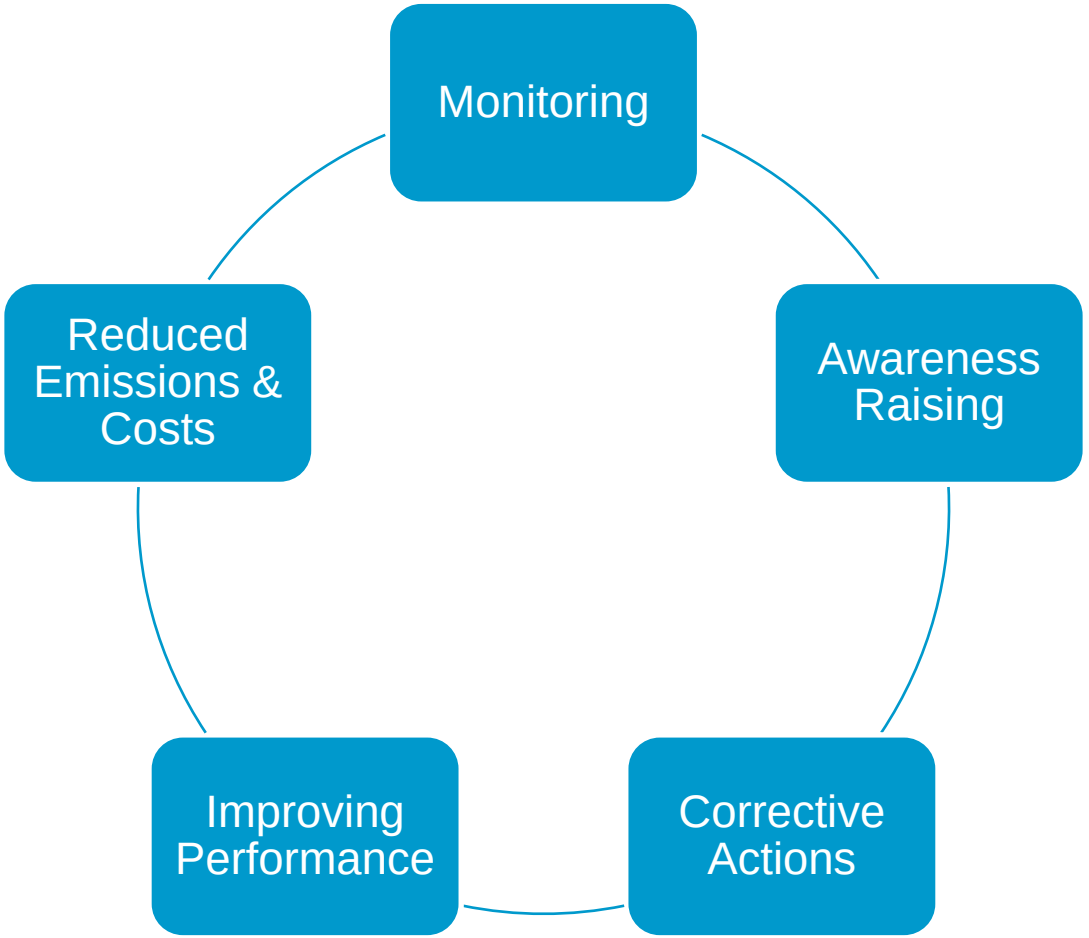
Road Construction Contributes 5-10% of Road Sector Emissions

- Emissions from road construction are set to increase in the future because of

- Major road development programs all over Asia:
  - India
  - China
  - East Asia
  - …

Why Measure Emissions From Road Construction?

- **Massive highway development programs are underway in Asia**
- **Relatively easy to mitigate emissions from road construction**
- **Most highway agencies are unaware about the impacts of road construction on emissions**
- **Important to raise awareness**



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Measuring Emissions is Becoming "Normal"

- World Bank has a handbook for estimating emissions from road construction (they used CHANGER)
- EC requires estimating impacts of infrastructure development
- AASHTO has guidelines for measuring emissions from road construction
- India has recently passed a circular requiring all road projects to estimate avoided emissions

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Understanding Emissions From Road Construction

- Work Type
  - Earthworks
  - Pavements
  - Culverts
  - Structures
  - Road furniture
- Type of Road
  - Expressway
  - National
  - Provincial
  - Rural – Gravel
  - Rural - DBST
- Generator
  - Transport
  - Material extraction
  - Machines

Emissions (t CO2 eq./km) by Work Item and Road Type

	Expressway	National	Provincial	Rural Gravel Road	Rural DBST
Earthworks	161	16		3	3
Pavements	**1334**	**425**	**12**	**72**	**86**
Culverts	238	51	157	12	12
Structures	**1068**	**119**	**17**	**3**	**3**
Road Furniture	432	182	0	0	0
Total	**3234**	794	207	90	103

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Emissions (t CO2 eq./km) by Road Type and Generator

	Transport	Materials	Machines	Total
Expressway	1004	**2122**	109	3234
National	235	**523**	36	794
Provincial	66	**112**	29	207
Rural – gravel	20	**56**	14	90
Rural – DBST	26	**62**	14	103

Several Tools Are Available

- ADEME Methodology (Bilan Carbon)
- AFD Tool
- BAM Tool (project carbon calculator)
- Highways Agency Carbon Tool
- Technical University of Denmark (Road-Res)
- **IRF GHG Calculator (CHANGER)**
- Victoria State Government (Vicroads)
- Egis Infrastructure Carbon Tool
- LCPC Tool (Ecorce)
- Highways Agency geotechnical tool
- Egis pavement tool (ImpRoad)
- Eurovia tool
- The Greenhouse Gas Emission Mitigation Toolkit for Highway Construction and Rehabilitation—ROADEO.

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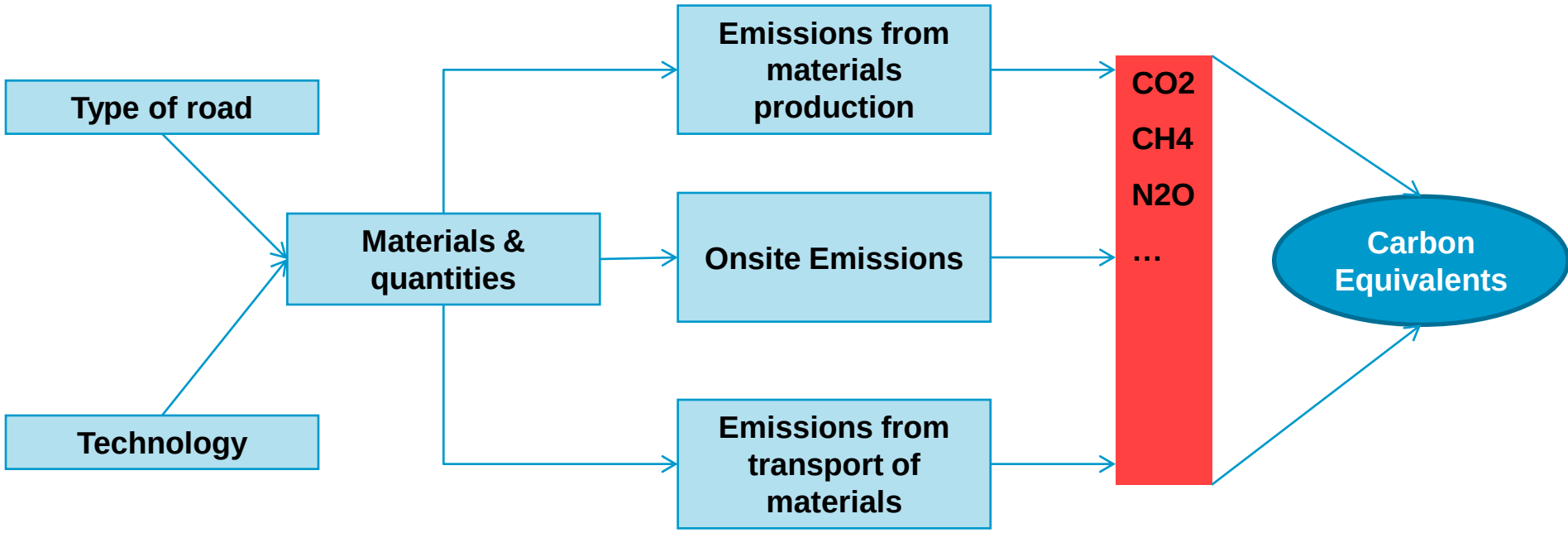
A Word About CHANGER

- It was one of the earlier tools to be developed
- Tried to be comprehensive
- Methodologically sound (it is not based only on fiction)
- It has its problems, BUT
- CHANGER put the issue on the policy agenda
- Defined a a road map
- Has had a significant effect on policy

Estimating Emissions



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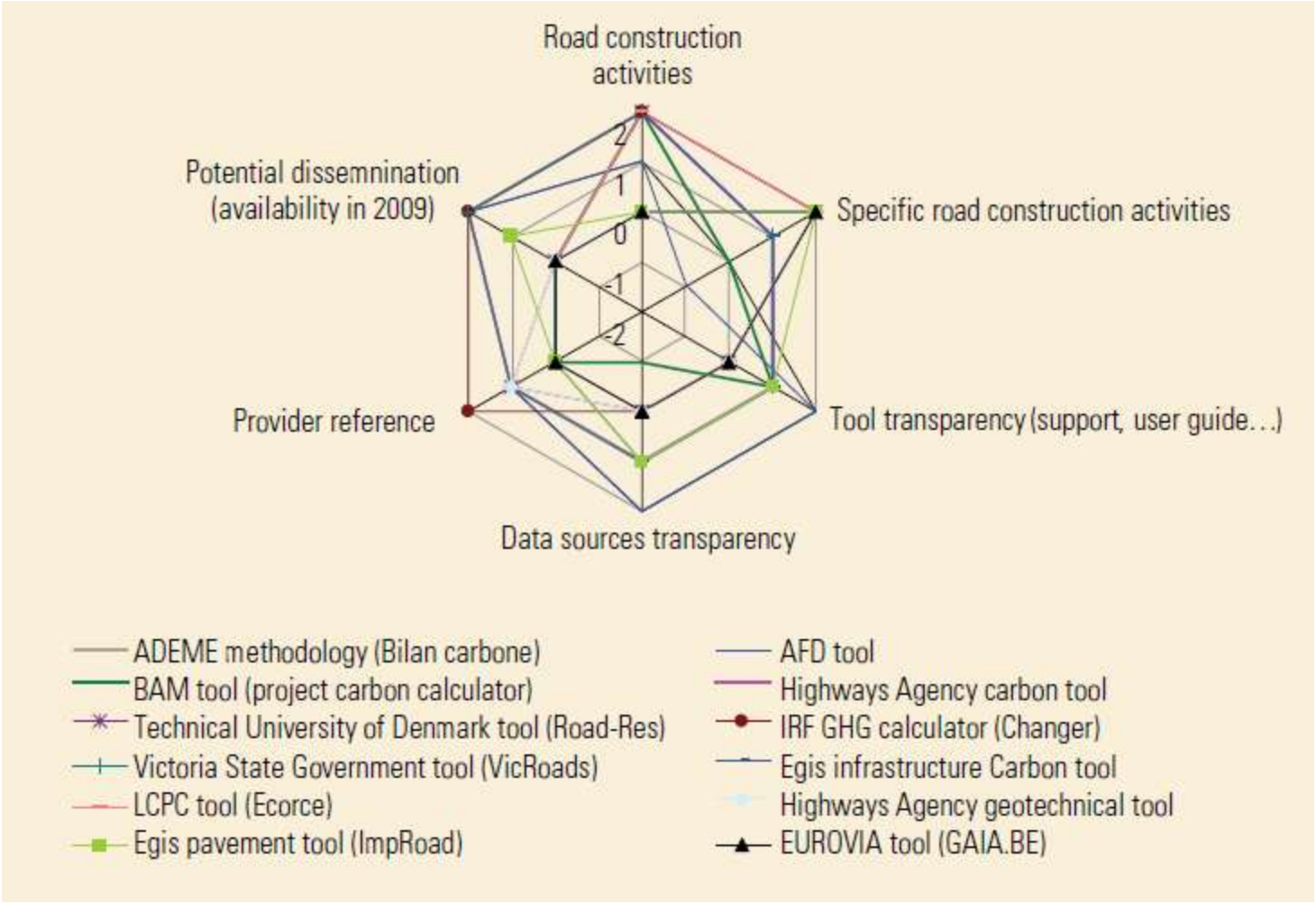
Comparing The Tools



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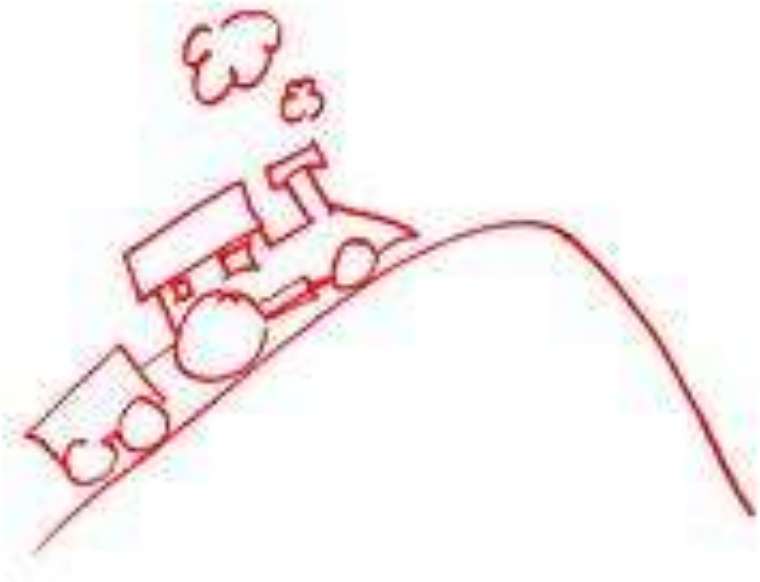
How Good Are The Tools?

- **Most of the tools are similar, but three tools stand out**
  - **IRF GHG (CHANGER)**
  - **Highways Agency Carbon Tool**
  - **The Greenhouse Gas Emission Mitigation Toolkit for Highway Construction and Rehabilitation—ROADEO**



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The Challenges in Measuring Emissions From Road Construction

- In general, ALL the tools are user unfriendly (minor problem – easy to improve)
- The calculations and methods can be questioned (moderate problem – slightly harder to improve)
- The data are often missing or made up (big problem – really hard to improve) – need for legislation
- Drawing boundaries is difficult – need for standards
- Capacity is an issue in adopting best practices – need for building capacity

The Way Forward

- **Legislate measurement** of carbon footprint of road construction projects (forget about measuring anything without this)
- **Create standards** for measuring emissions and link them to the legislation
- **Build capacity** to incorporate construction best practices
- **Raise awareness** about the economic benefits of best practices

THANKS FOR LISTENING

(I know it can be boring`, but it is important)

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