Latin America Clean Transport Forum
Siemens eHighway

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Irma Wilde

September 2nd , 2015

Latin America Clean Transport Forum, México City

Global political direction and goals

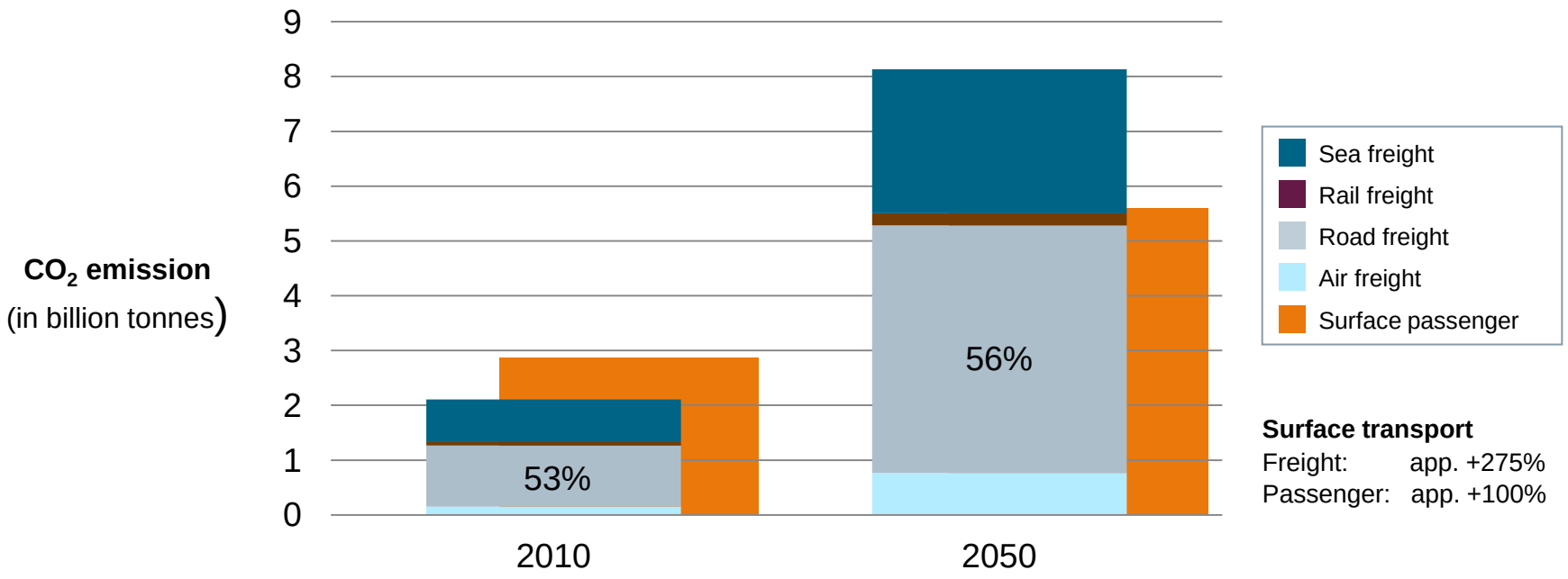
We emphasize that deep cuts in global greenhouse gas emissions are required with a ***decarbonisation of the global economy over the course of this century****.*

We support […] the upper end of the latest IPCC recommendation of ***40 to 70% reductions by 2050 compared to 2010***

We commit to […] achieve a low-carbon global economy […] including […] ***striving for a transformation of the energy sectors by 2050*** - Leaders' Declaration G7 Summit Elmau

Freight will replace passenger traffic as main source of CO_2 emissions from surface transport

Global transport emissions, by mode



Surface transport
Freight: app. +275%
Passenger: app. +100%

Road freight will remain the majority emitter in the goods transport sector

Source: The ITF Transport Outlook 2015

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Los Angeles case

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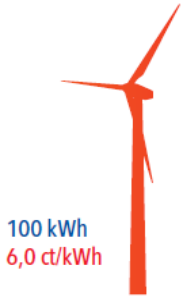
Zero-emission trucks are possible with renewable energy, but efficiency varies greatly



Pathway	Range Cost per km	Efficiency WTW	Example vehicle
Electric Road Systems e⁻ → Grid (incl. catenary) → e⁻ → eTruck (Catenary-Hybrid) 96 kWh, 12 ct/kWh; 1,6 kWh/km	60 km 19 ct/km	77 %	
Battery e⁻ → Grid → e⁻ → eTruck (Battery) 96 kWh, 10 ct/kWh; 2 kWh/km	48 km 20 ct/km	62 %	
Hydrogen e⁻ → Elektrolyse η = 70 % → H_2 → H_2-Netz* → H_2 → C.H_2-Tankstelle → C.H_2 → Fuel cell truck 2 kWh; 5 kWh 93 kWh; 65 kWh, 15 ct/kWh; 65 kWh, 18 ct/kWh; 65 kWh, 20 ct/kWh; 2,7 kWh/km	24 km 55 ct/km	29 %	
Power-to-Gas e⁻ → Elektrolyse η = 70 % → H_2 → Methanisierung η = 80 % → CH_4 → NG-Netz* → NG → CNG-Tankstelle → CNG → Gas-truck 2 kWh 98 kWh; 69 kWh, 15 ct/kWh; 55 kWh, 19 ct/kWh; 55 kWh, 20 ct/kWh; 55 kWh, 22 ct/kWh; 3,2 kWh/km * inklusive Speicher	17 km 70 ct/km	20 %	

Source: German Ministry of Environment

Electrification of hybrid trucks via an overhead catenary system

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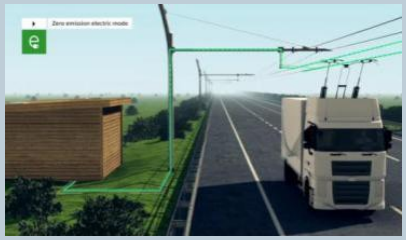
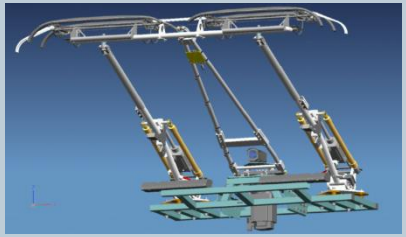
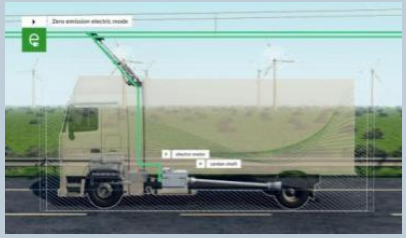
Electrification infrastructure



Active current collector



Hybrid-electric drive train



Advantages

- High **energy efficiency**
- **Reduced** operating **costs**
- **Swift integration** into existing infrastructure
- **Safe, reliable & open** technology

Outlook for projects and market in LA

Demonstrator	Near-dock rail connection	Interstate-710	Regional connection
			
▪ **Length:** ~1 mile ▪ **Timeline:** 2015 ▪ **EH-Vehicles:** 4	▪ **Length:** ~5 miles ▪ **Timeline:** 2016-2019 ▪ **EH-Vehicles:** 400 Source: POLA/POLB strategic plan 2019	▪ **Length:** ~22 miles ▪ **Timeline:** 2020-2030 ▪ **EH-Vehicles:** 46,000 Source: I-710 Draft EIR/EIS	▪ ~30 miles of East-West Freight Corridor (EWFC) ▪ Planned before 2035 Source: SCAG regional transportation plan

Implementing Siemens' eHighway concept in Southern California is an unique opportunity to make the area more sustainable through an innovative solution

Electrification is especially attractive on highly frequented routes

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eHighway application fields

in the near term

Shuttle transport

- Solution for high frequency shuttle transport over short and medium distances

Electrified mine transport

- Connection of pits and mines to storage or transit locations

in the long term

Electrified long-haul traffic

- Economical and sustainable alternative for road freight transport

The development path of road electrification is likely to echo that of rail electrification a century ago

Summary

Siemens eHighway concept

- Hybrid-electric trucks with active pantograph for connecting to overhead wires
- Commercial truck development ongoing together with e.g. Scania & Volvo
- Near-term first demonstrations on public roads near ports and hinterland connections
- Reduces dependence on oil and is a low-CO_2 alternative for the decarbonisation of transport
- Especially viable for single transport routes with high heavy-duty traffic rates, e.g. connections between ports and inland logistics centers
- Compatible with and complementary to other alternative fuel technologies

Electric heavy-duty transport for road-based freight is technically feasible and realistic for many applications and transport routes

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Thank you

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