ØRESUND
ECOMOBILITY

Future Technologies and
and Supply Chian Solutions for Green Corridors

WS Malmö March 9, 2011

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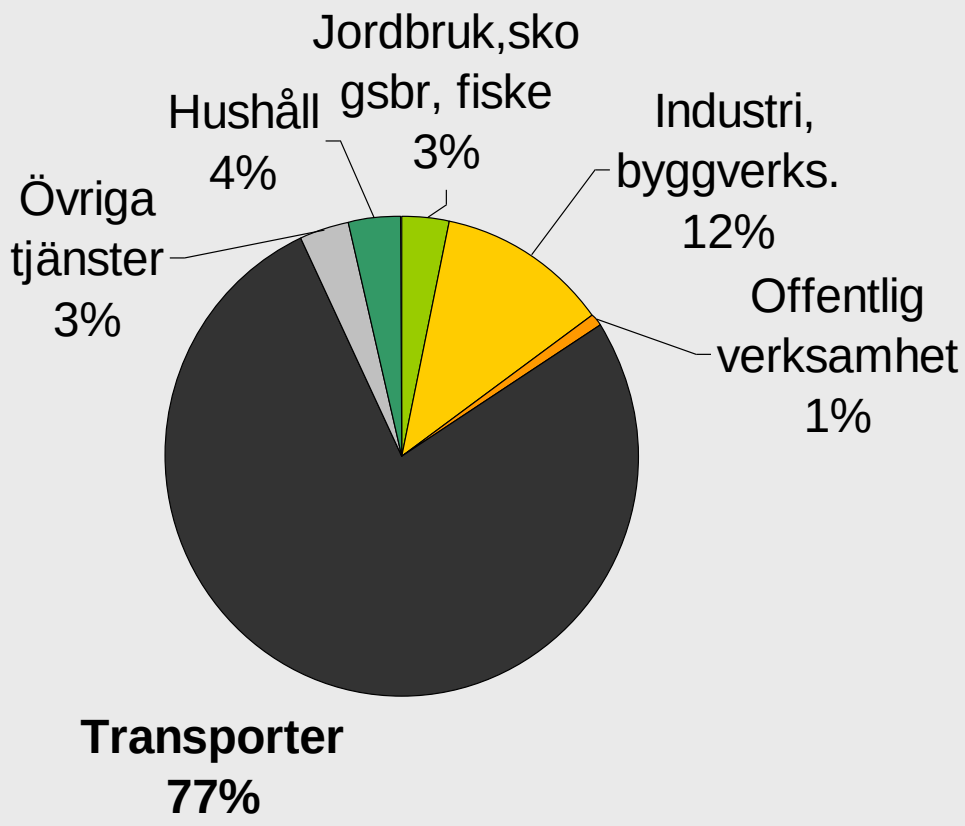
EUROPEAN
UNION
European Regional
Development Fund

Interreg IV A
ÖRESUND – KATTEGAT – SKAGERRAK

EcoMobility: Öresundsregion fossile free 2020

1. TVN1: Green Logistics Hub
   - Green Corridors
2. TVN2: City Logistics
3. TVN3: Energy Carriers and Technology Systems

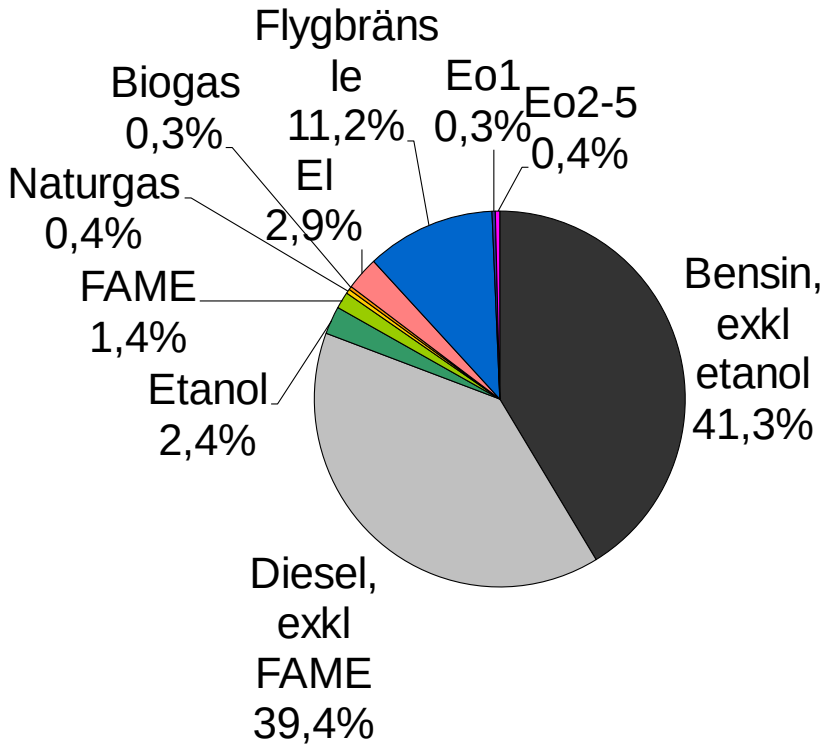
Oil use in Sweden



Transport Oil Dependent

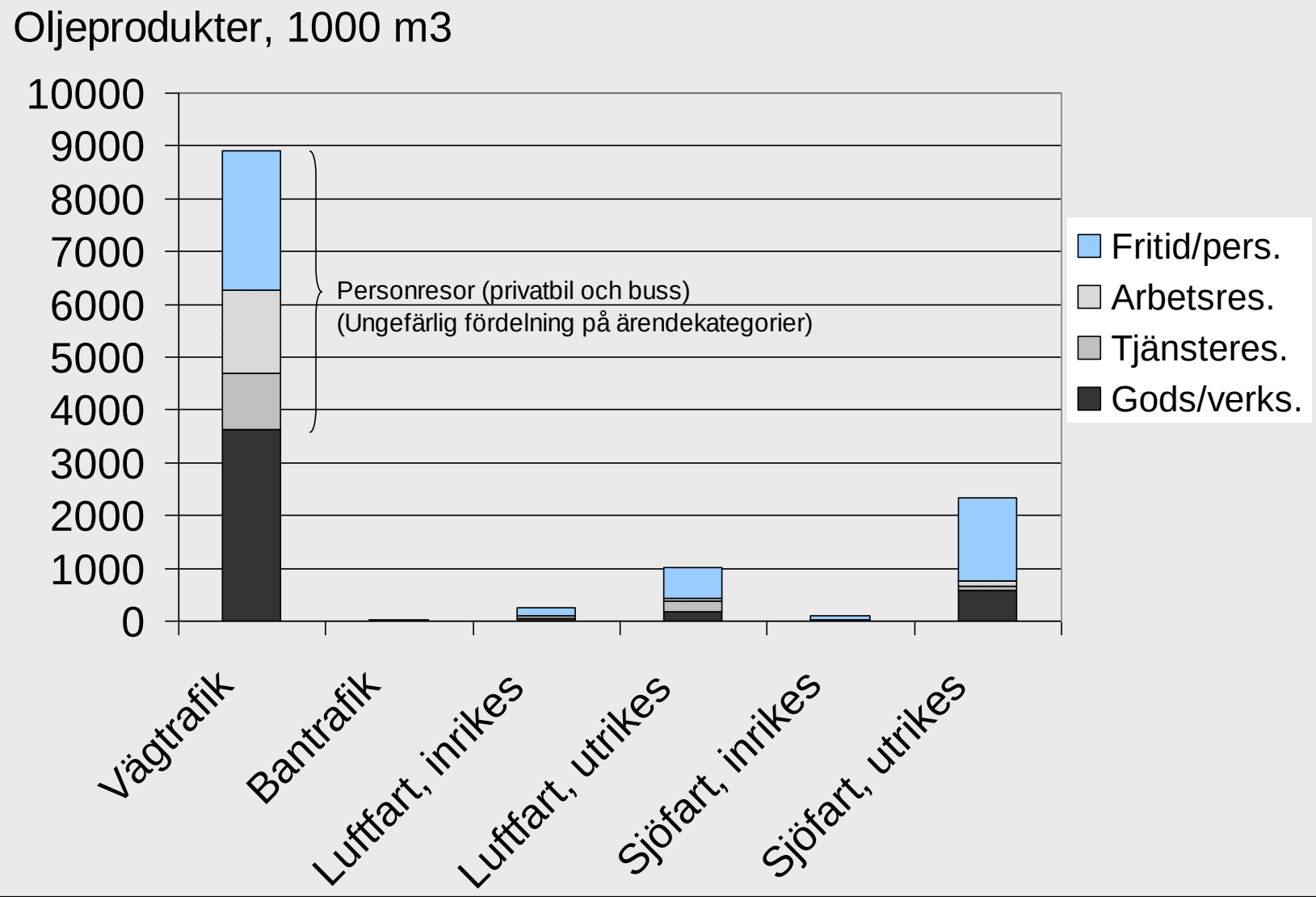
93 % olja

Energianvändning i transportsektorn 2008 (prel)

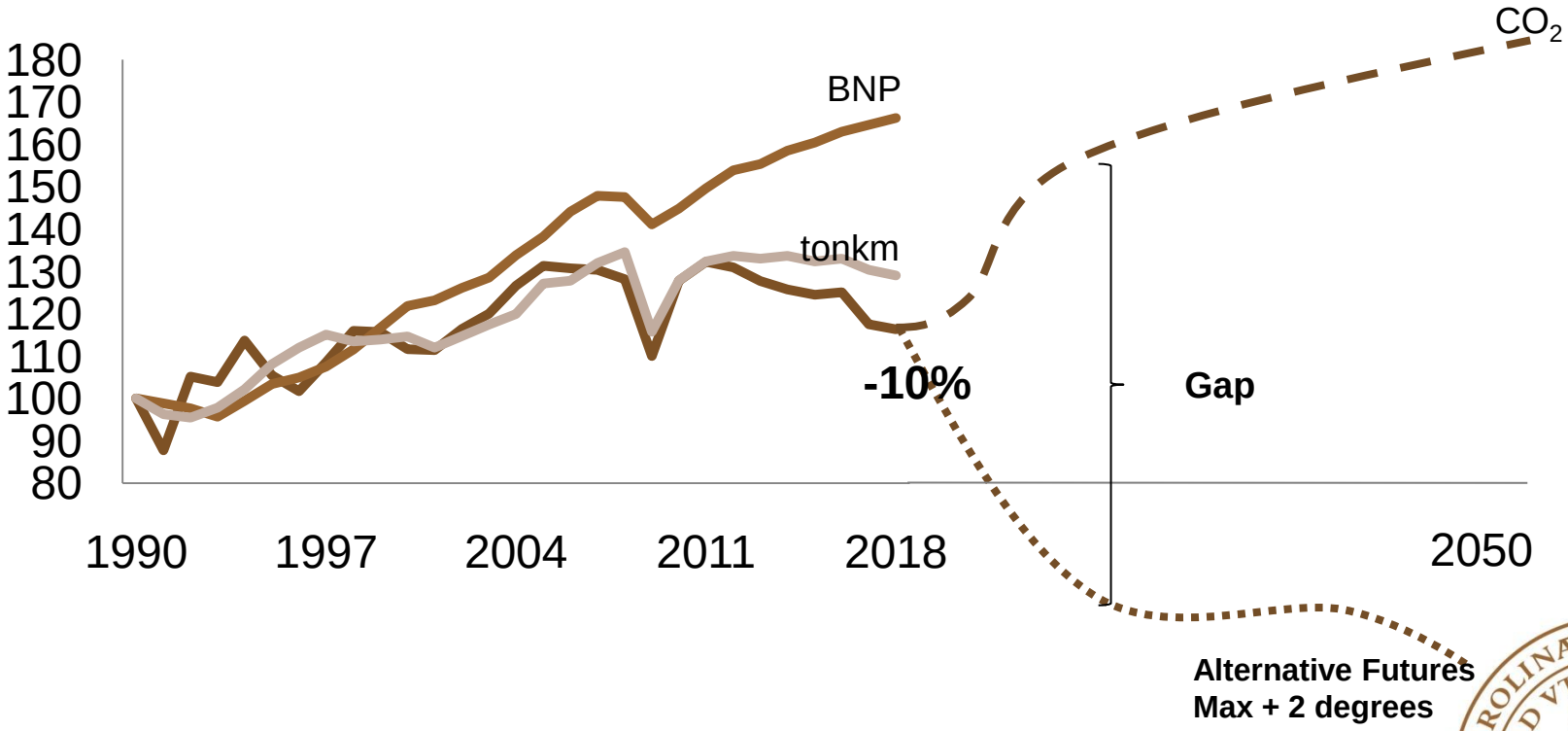


Trivectors bearbetning av Energimyndighetens prel siffror 2008

Transport oil by Mode



Large gap between Goal and BAU 2050



Framework to reduce GHG emissions from logistics and freight transport

$$CO_2\text{emissions} = \text{GDP} \times \frac{\text{ton}}{\text{GDP}} \times \frac{\text{tonkm}}{\text{ton}} \times \frac{\text{vehiclekm}}{\text{tonkm}} \times \frac{\text{kWh}}{\text{vehiclekm}} \times \frac{CO_2\text{emissions}}{\text{kWh}}$$

ECONOMIC ACTIVITY	INVERSE VALUE DENSITY	TRANSPORT INTENSITY	TRAFFIC INTENSITY	ENERGY INTENSITY	EMISSIONS INTENSITY

- **Technology?**
- **Behavior?**

Source: Fredrik Eng-Larsson

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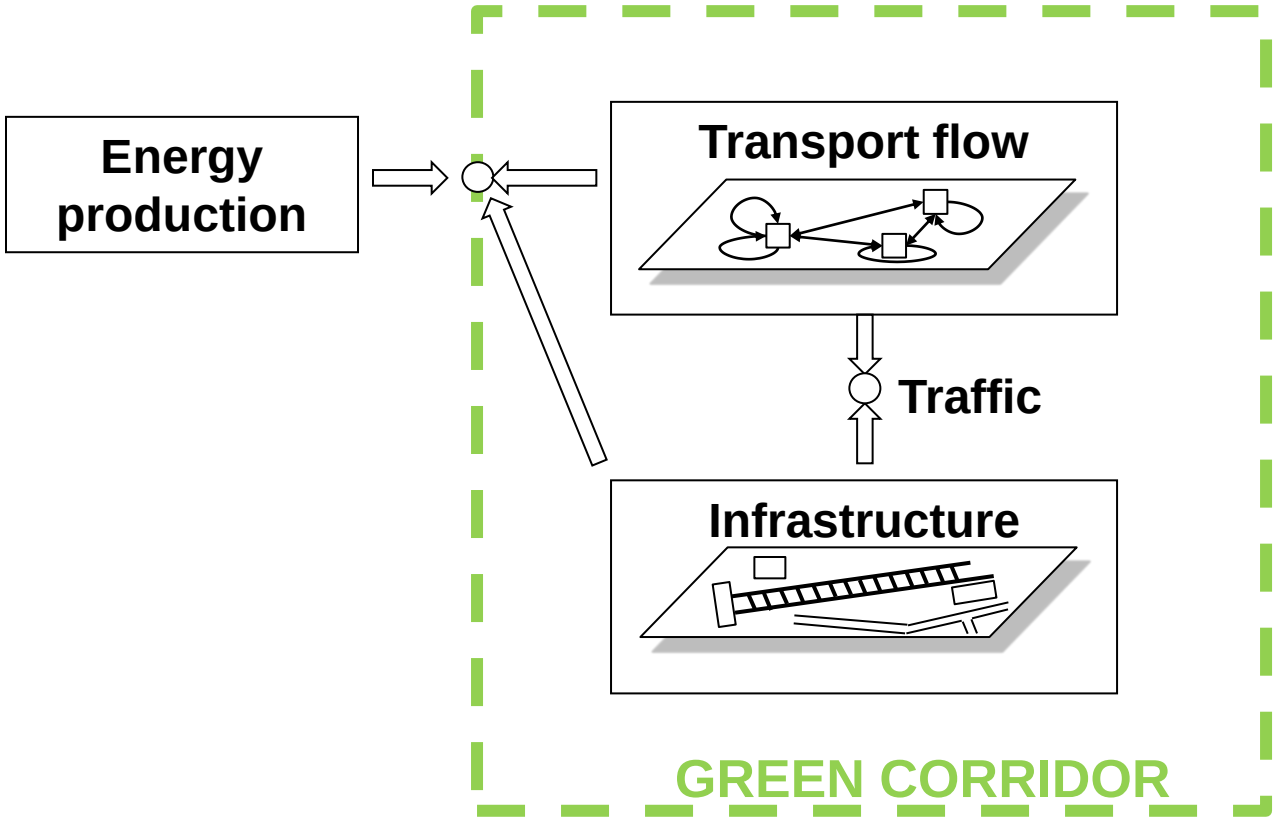
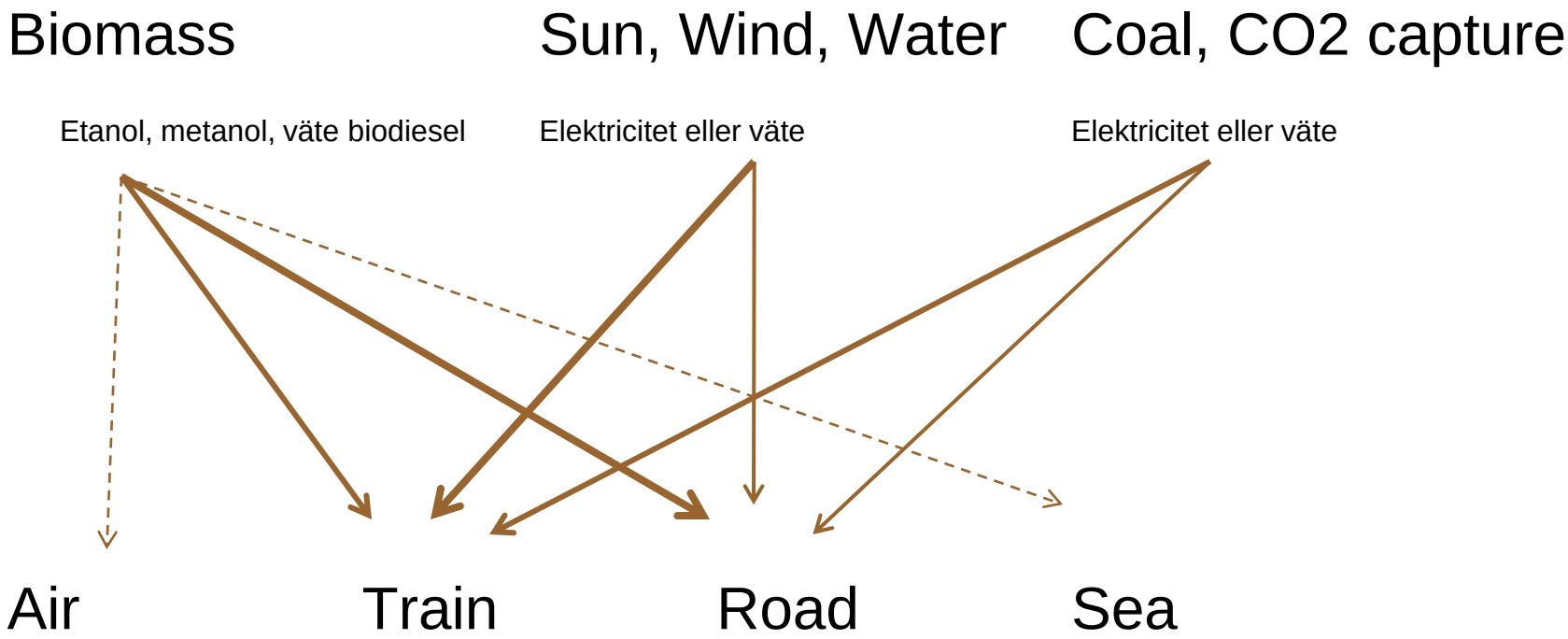


Sustainable energy carriers



Air and Sea most difficult!

Battery requirements for electric propulsion

10 kg for 10 km **Possible!**

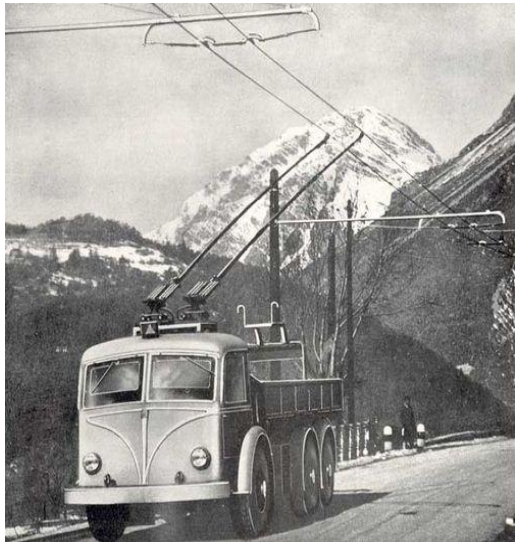
40 kg for 10 km **Possible!**

200 kg for 10 km **Possible!**

20 tons for 1000 km
Not possible!

45 000 tons of batteries.
The take off weight is
413 tons ! **Not possible!**

Historic pictures



Alternative solutions + / -

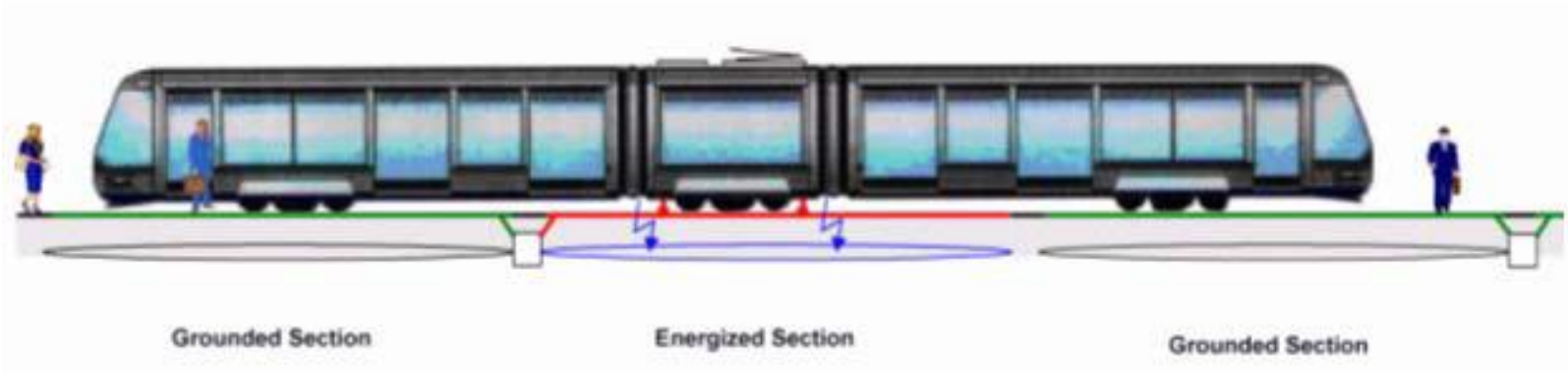
	Inductive	Conductive
Top 	• Unrealistic due to size and weight • Low efficiency • Visual impression	• Already in use • Low cost • Does not work for cars • Visual impression
Side 	• Works for all road vehicles • Unsafe for objects on roadside • Low efficiency • Heavy, bulky and expensive • Only one lane possible	• Works for all road vehicles • Low cost • Unsafe for objects on roadside • Only one lane possible
Under 	• Rugged and Safe • Expensive • Low efficiency • EMC	• Works for all road vehicles • Low cost • High efficiency • Safe and rugged?

INNORAIL, Bordeaux, I

FIGURE 12 Citadis LRV.

INNORAIL developed for tram by Alstom/Spie, also called **APS** (Alimentation par Sol),sequential 8+3 meters sections. Used in Bordeaux, France

INNORAIL ground level switched contact system.

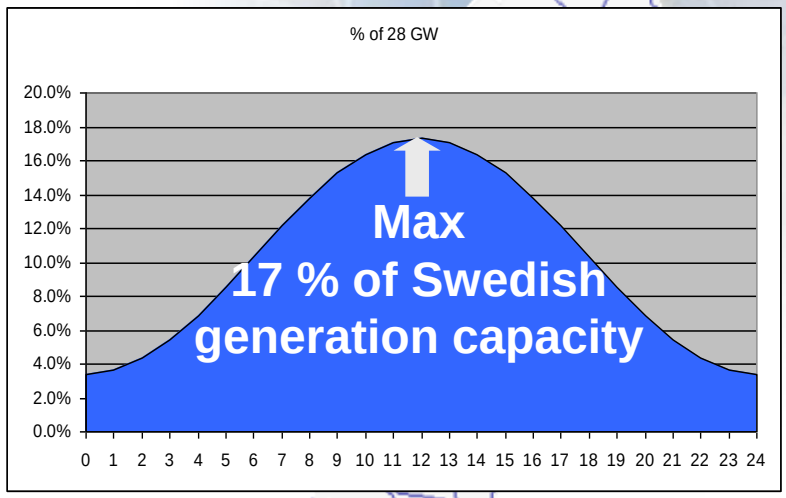


Scanias vision med induktion underifrån

A Slide In Sweden means …

- **An installation cost of 4 MSEK/km or < +10 % on new roads.**
- **We have 20 000 km "Riksväg" in Sweden**
  - Total cost about 80 000 MSEK or 3.0 % of BNP
  - We produce Gasoline and Diesel for about 50 000 MSEK annually, without taxes.
- **If ALL Road Vehicles convert to Plug In + Slide in, then:**
  - The El **Energy** Generation will increase with < 18 % of todays production of 150 TWh
  - The El **Power** Generation will increase with < 17 % of todays max capacity of 28 GW

Possible!



- *A real alternative (maybe the only) to fossil based transportation !*
- **Makes EVs and PHEVs, with 40-200 km range, long distance transport vessels**

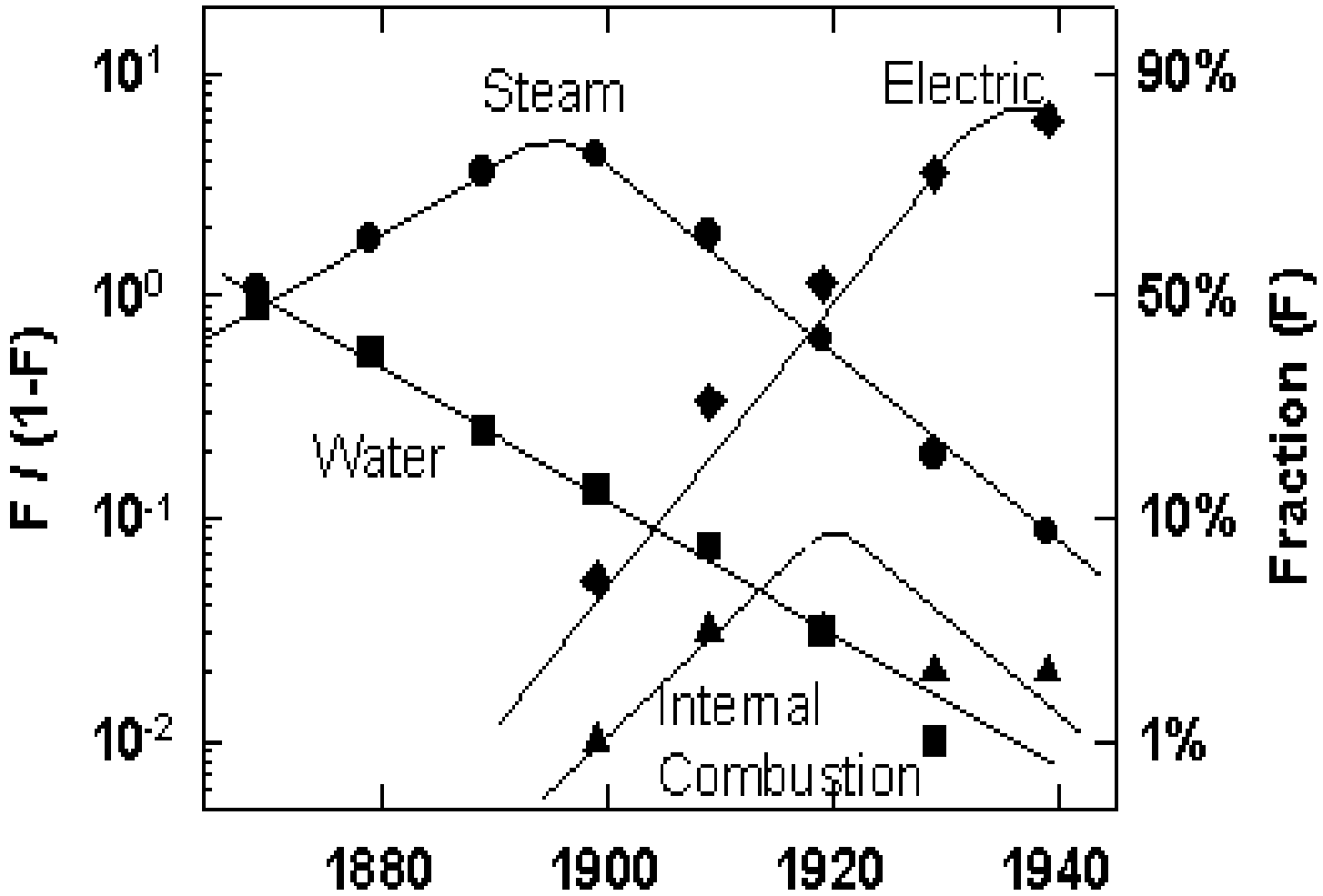
Conclusions

- **Any Road Transport can be Electric**
- **Requires “Slide In” technology**
- **Needs reasonable Electric Energy generation**
- **Eliminates Fossil Fuel Dependence**
- **Opens for all renewable “fuels”, including solar, wind, hydro, wave, …**

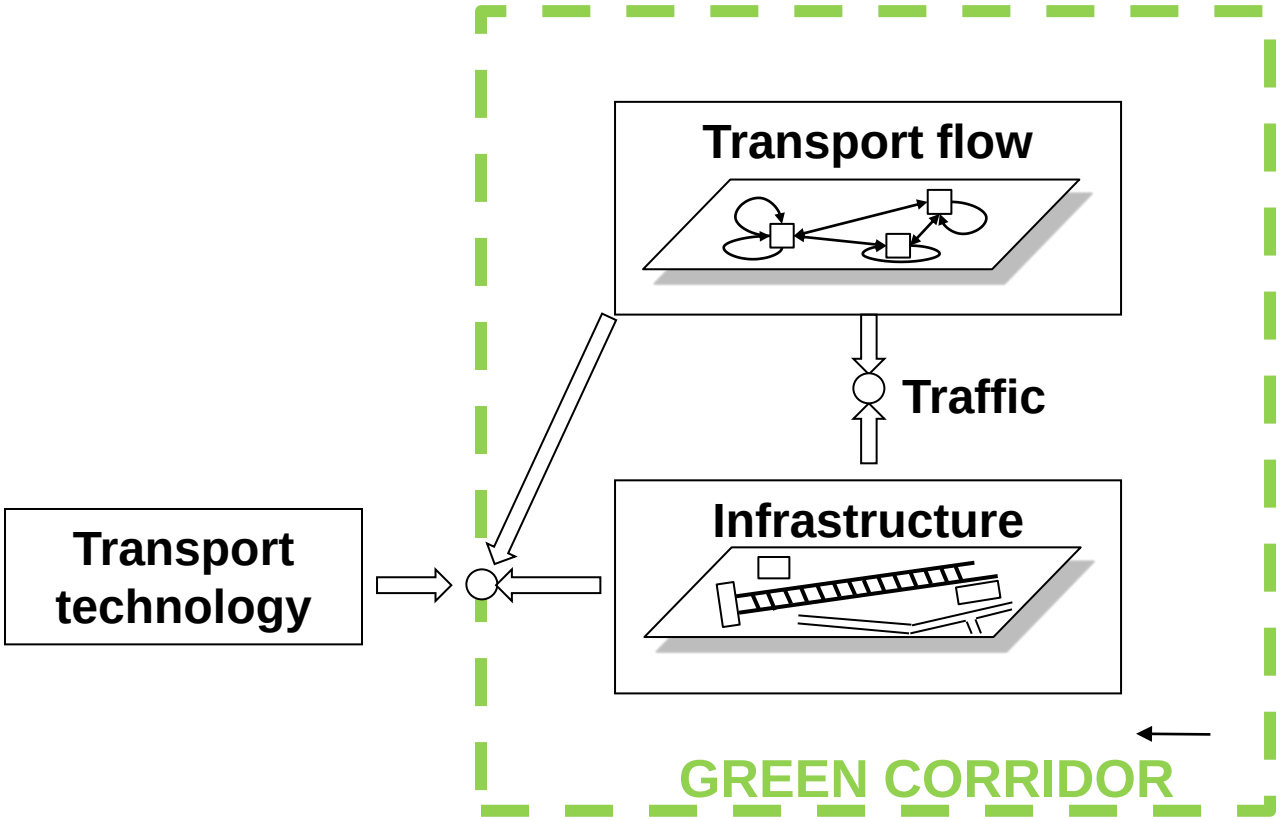
- **But how?**
  - Where start
  - Health
  - Automatic chaufeuring
  - Billing
  - …

Kraftkällor (kW) i industrin I USA

US



Källa: Ausebel & Marchetti, 1996



Shift av transportslag

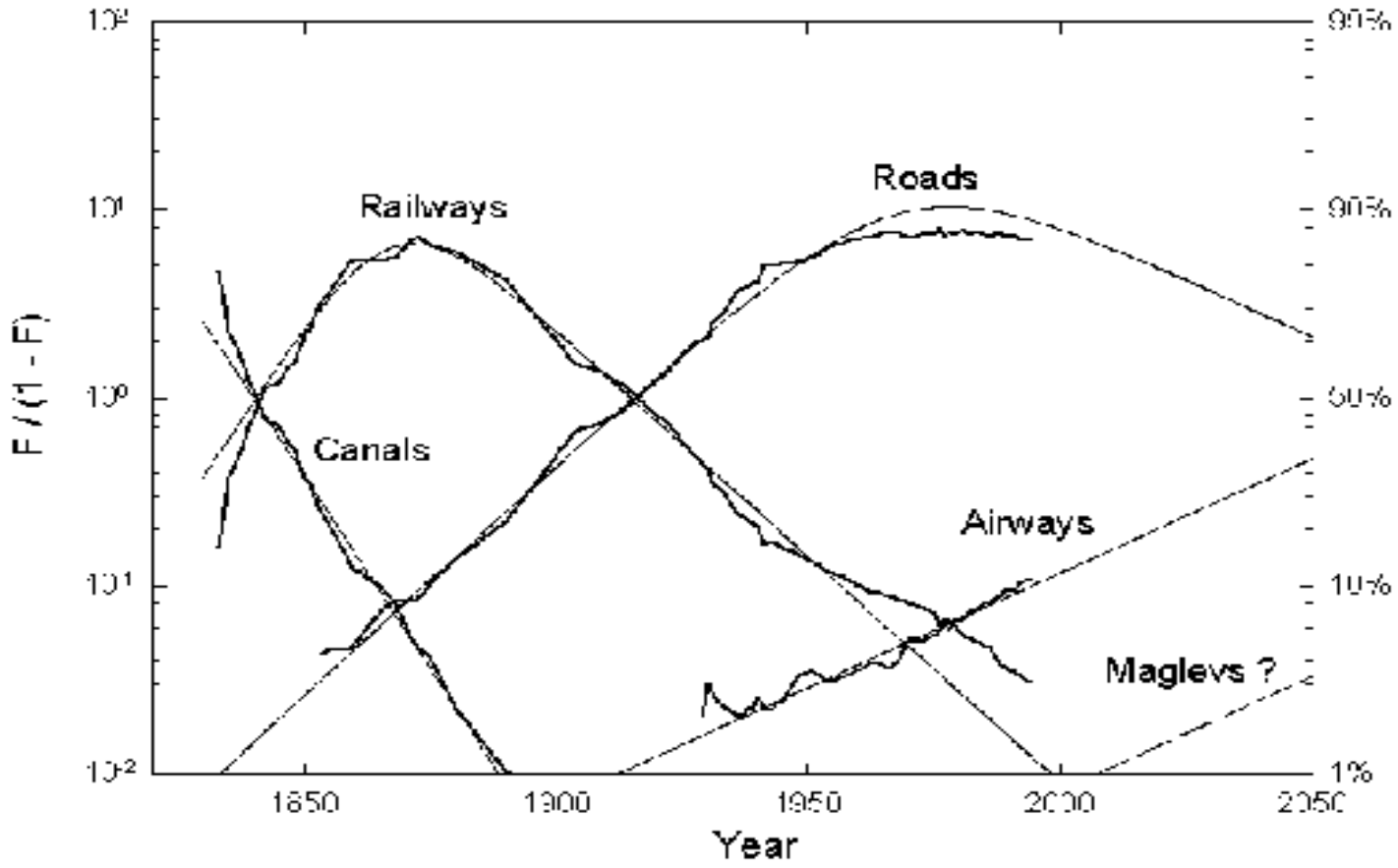


Figure 4 . Shares of the actual total length of the US transport infrastructure (squiggly lines) analyzed with the logistic substitution model (smooth lines). F is the fraction of total length or the market share. The logarithmic scale in the ordinates renders the S-shaped logistic linear. Sources of data: Gruebler [23], US Bureau Of The Census [21,28], US Department Of Transportation [33,34].

Källa: C. Marchetti, 1998

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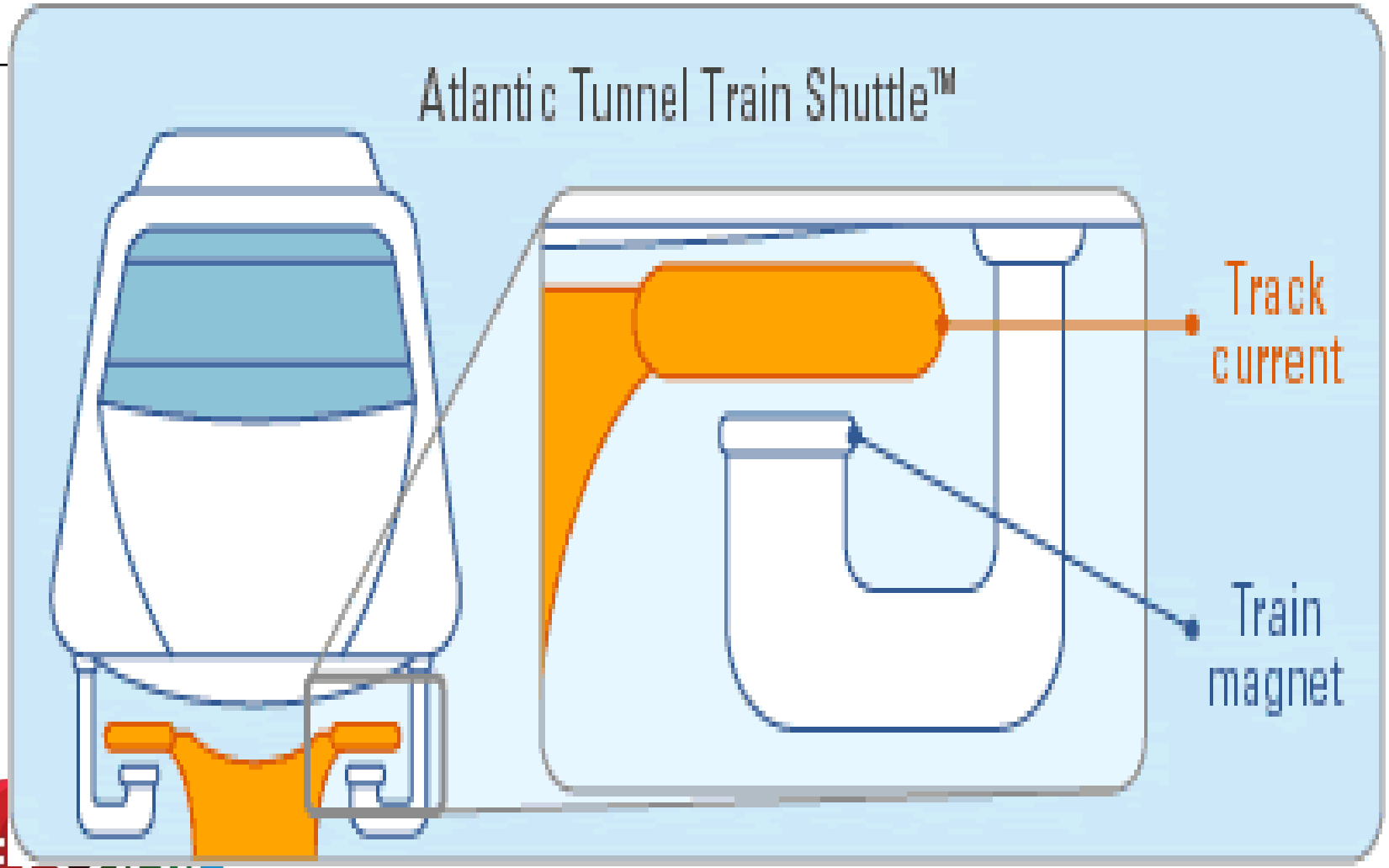
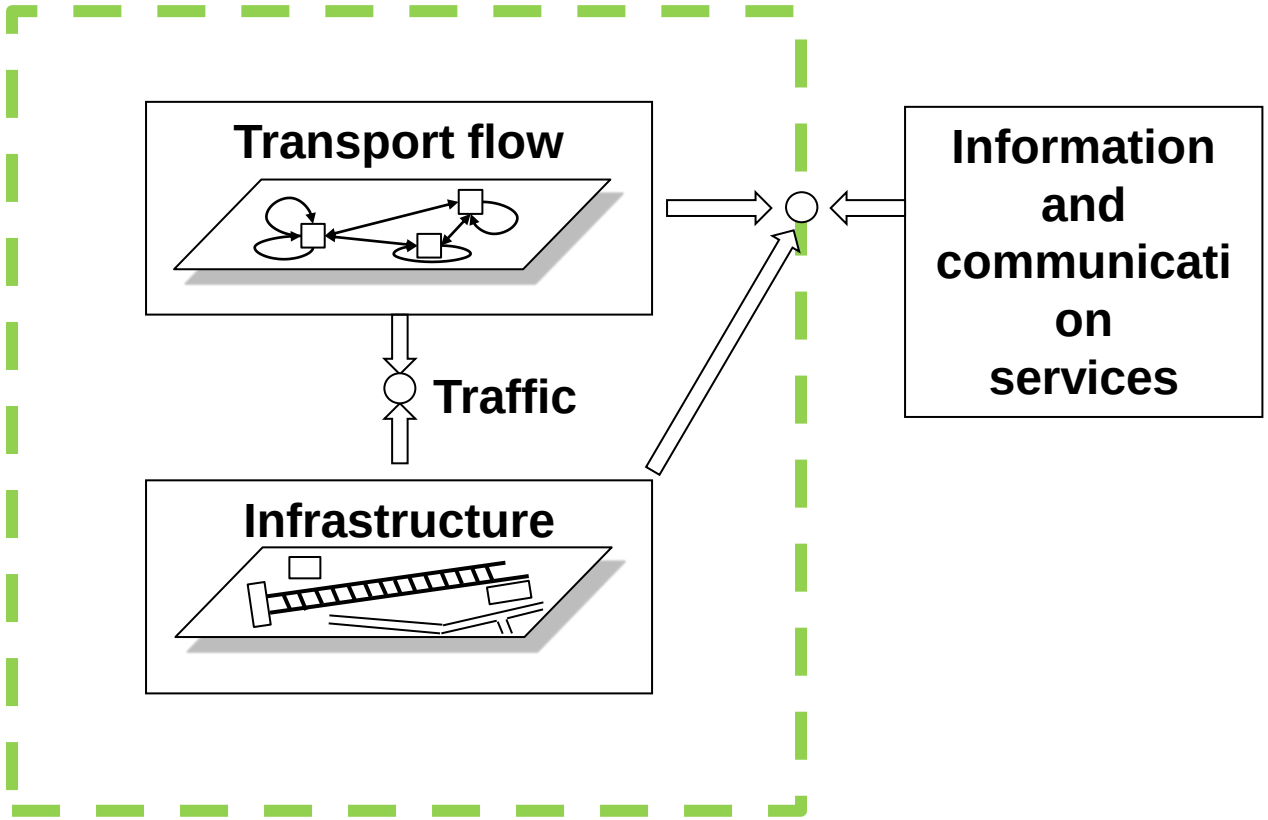
Super-Barges cross Baltic

- Puerto Rico – Florida
- 9 knots
- 1/3 Energy
- Biofuel?
- 3 man crew
- Driver load/unload
- 1 in, 1 out bound
- 1/10 cost of ferry


Atlantic Tunnel Train Shuttle™
Track current
Train magnet



Nästa 40 åren
olika ”clock speed”

Människan:

- 1,5 ny genration människor, barn vid 30, ändrade värderingar/beteenden
- 10 decennier, ändrade attityder

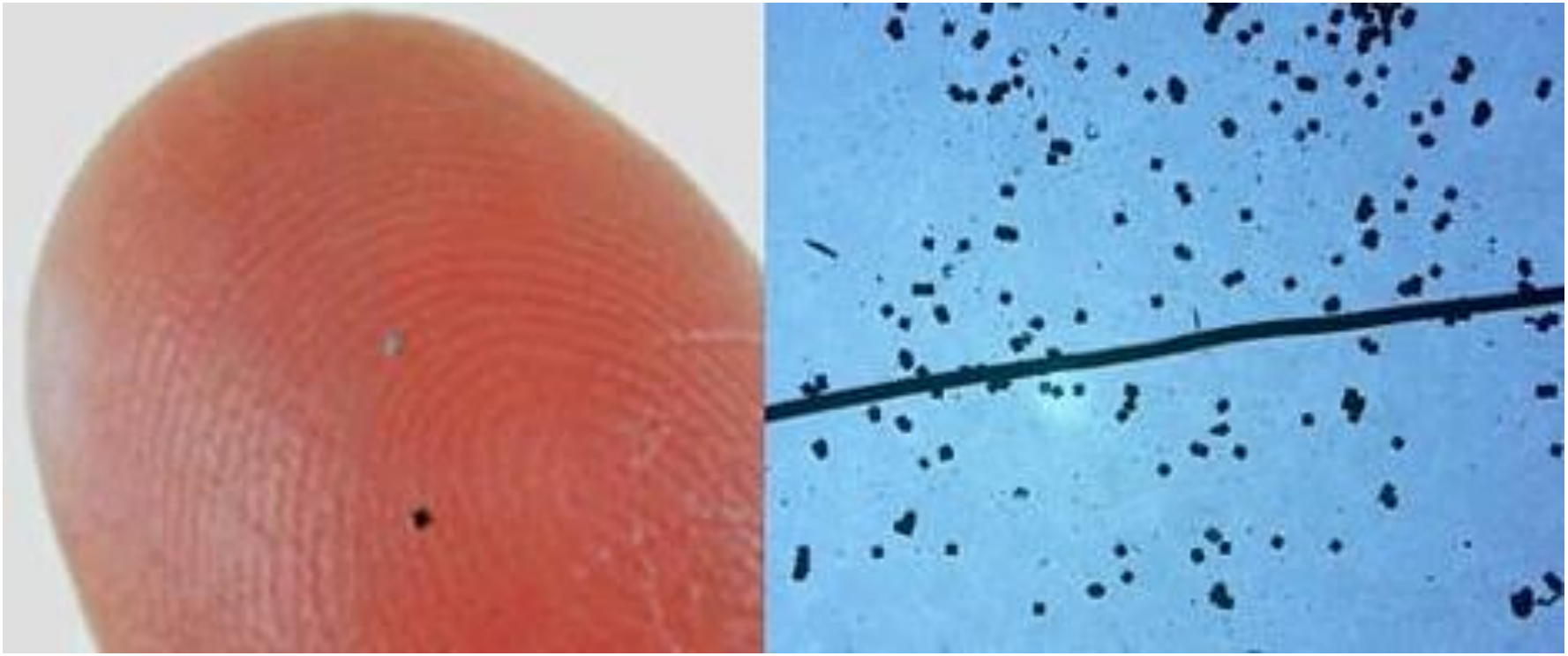
Transportteknik:

- 1 ny generation transportinfrastruktur eller transportslag
- 2 nya generationer farkoster, 20 års livslängd, lastbilar 7, flygplan & båtar 30 år

Informations- och kommunikationsteknik:

- 5 nya generationer mobil kommunikationsinfrastruktur, 8 års livslängd,
- 9 G mobilnätet: alla människor, tamdjur, farkoster, paket, och prylar uppkopplade. Internt of Things.
- Klusters: Body Area Network, Personal Area Network, Intelligent Homes etc.
- 13 nya generationer terminaler, 3 års livslängd, datorer, mobiltelefoner, trådlösa etiketter/sensorer/

RFID tags

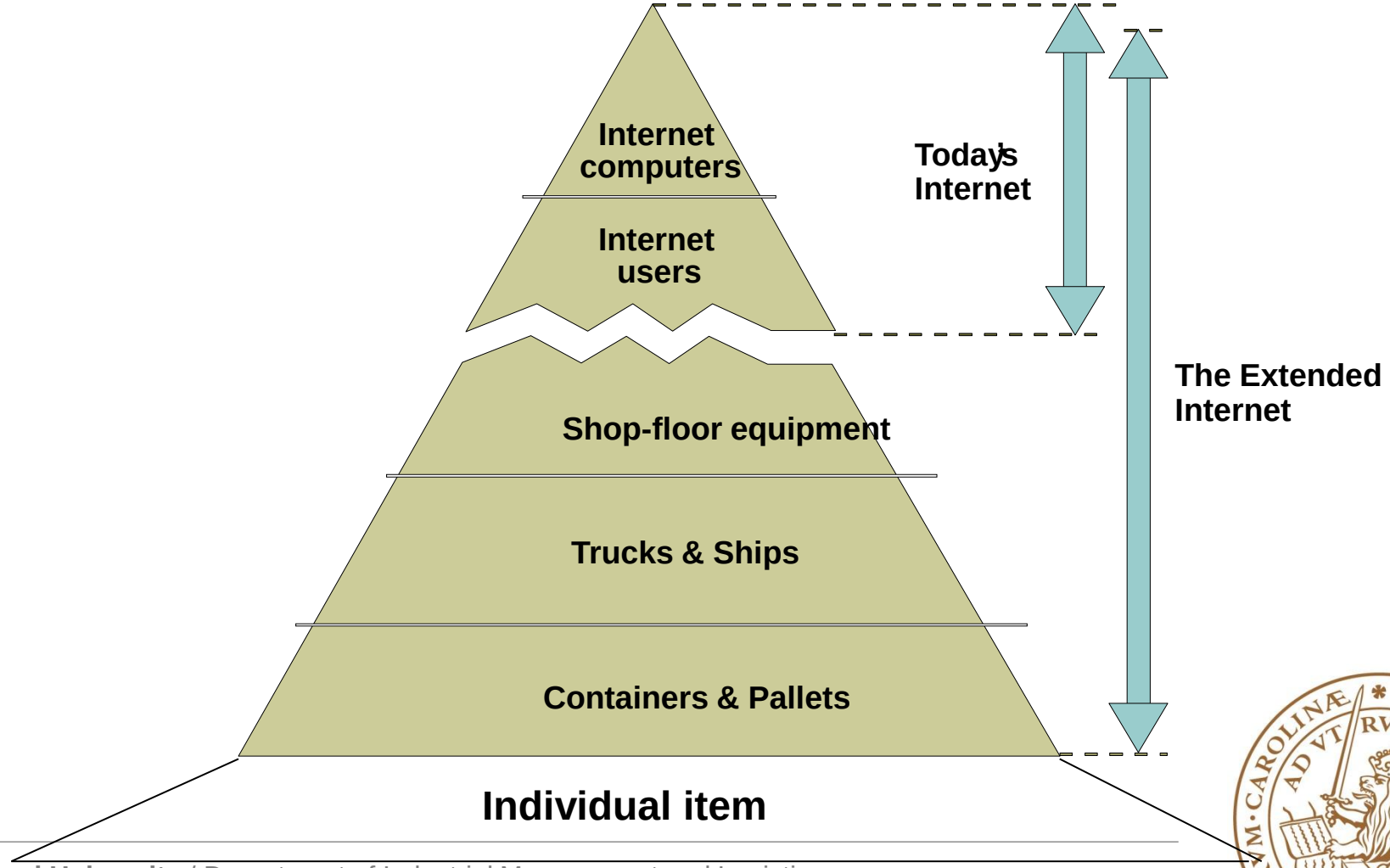


Hitachis mu-chip

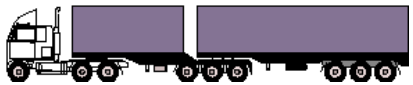
Nya 64 ggr mindre vid Hårstrå
t. ex. “intelligent” papper

Blandas i papper, internetadress avläses med mobilen

P2P - The ultimate internet
all products and packages talk to each others



Network classification

PBS ROAD CLASS		EXISTING ROUTE
LEVEL 1 ACCESS (L1)*		GENERAL ACCESS
LEVEL 2 ACCESS (L2)		B-DOUBLE
LEVEL 3 ACCESS (L3)		TYPE 1 ROAD TRAINS
LEVEL 4 ACCESS (L4)		TYPE 2 ROAD TRAINS

**** L1 roads would become the default classification, subject to existing local constraints on general access heavy vehicles***

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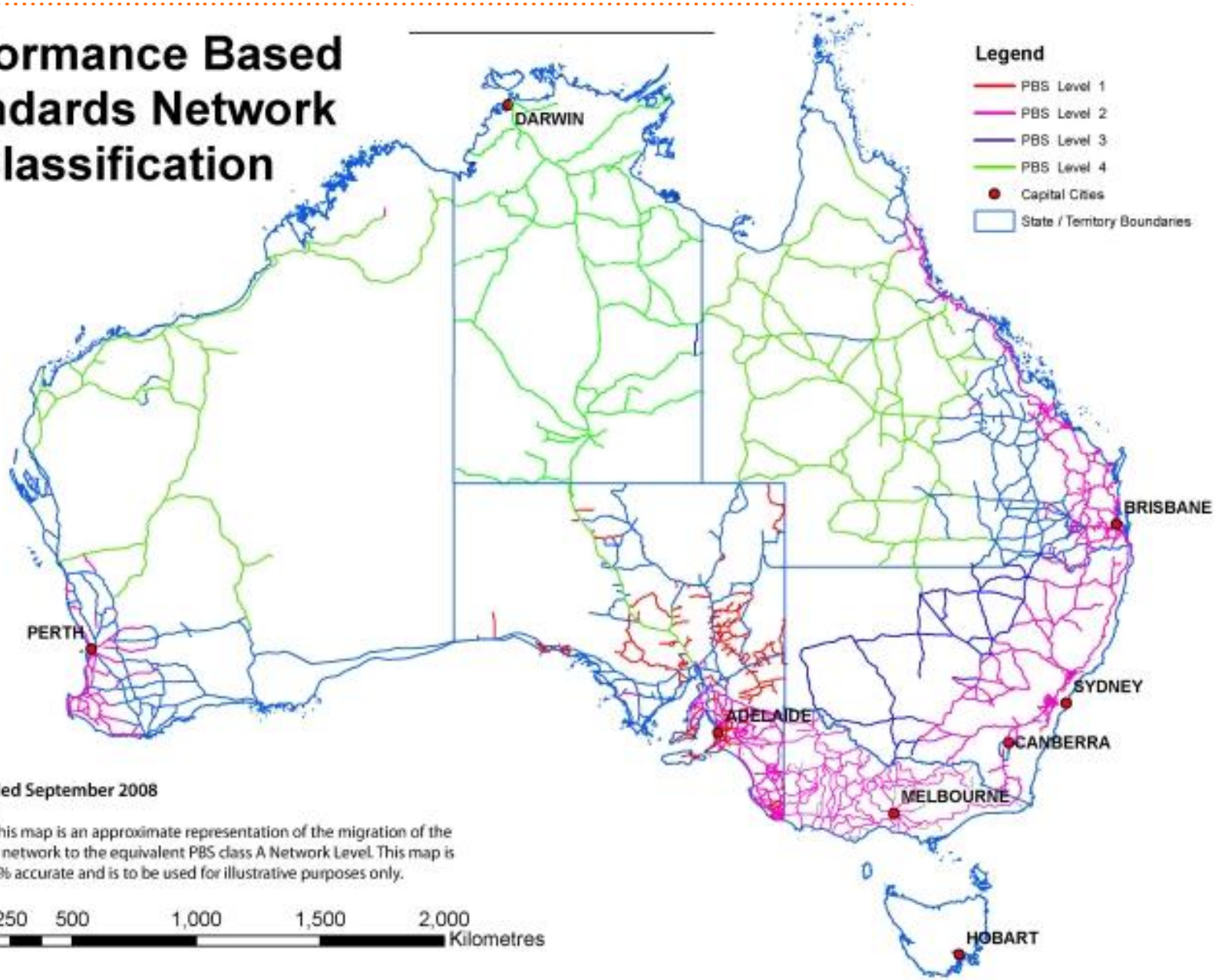
Performance Based Standards Network Classification

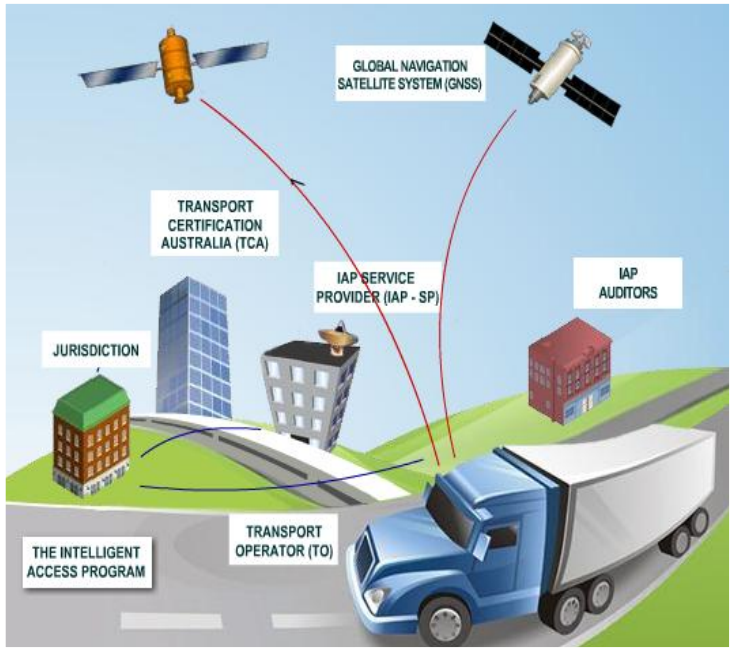


Australiska Intelligent Access Program (IAP) alla lastbilar över 25 m

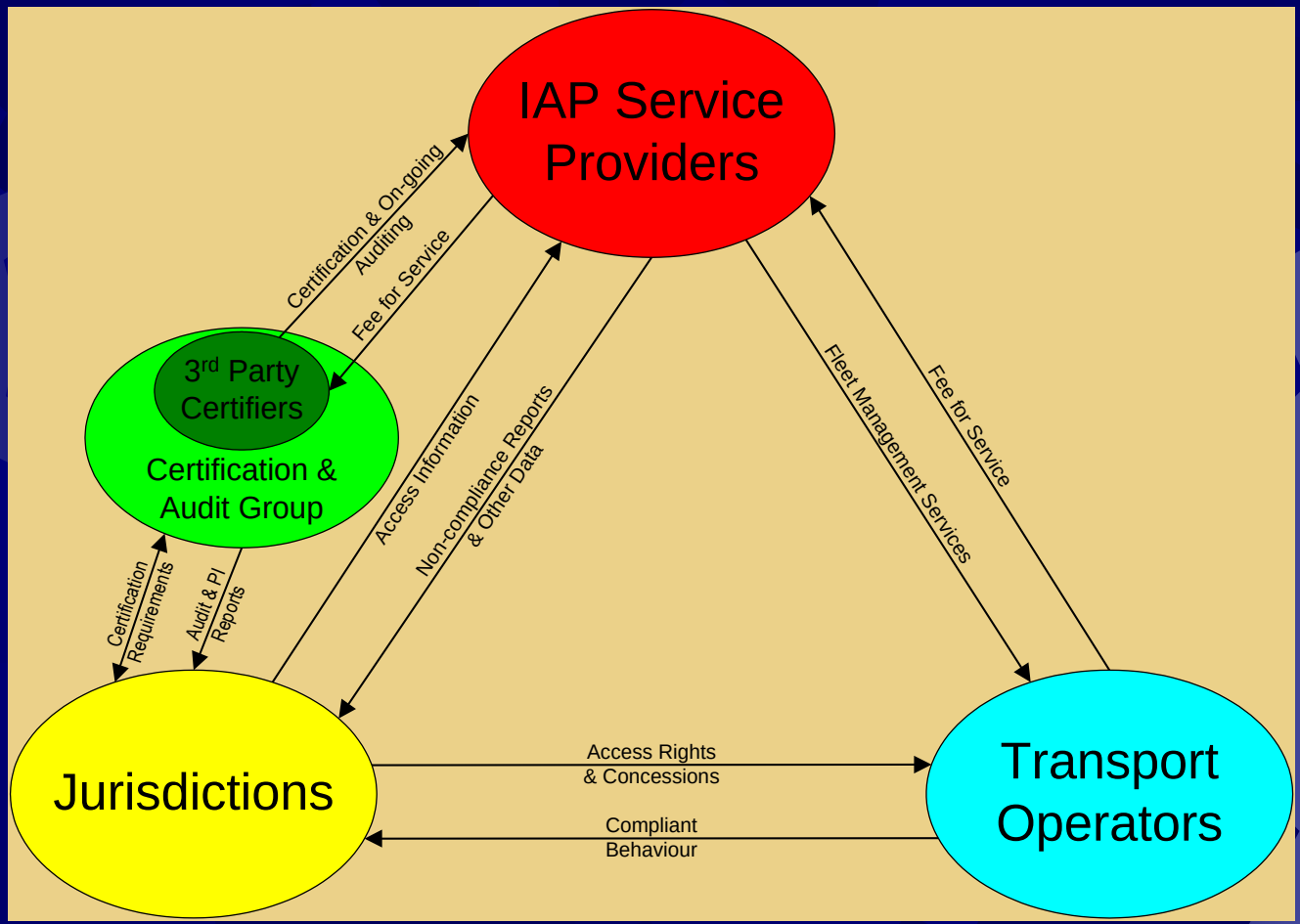
- General Access (1st Generation)

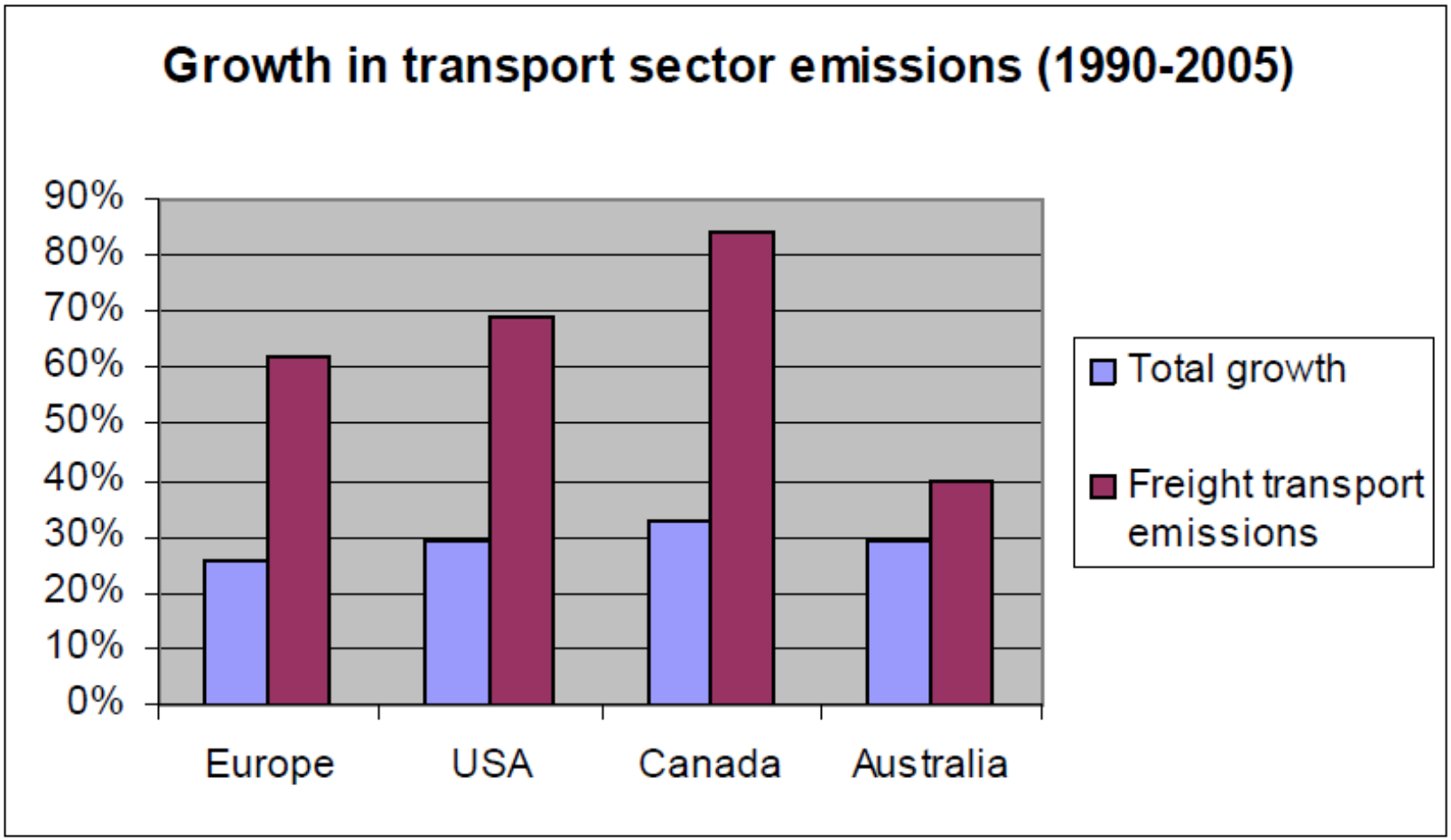
- Restricted Access (2nd Generation)

▲ Intelligent Access (3rd Generation)

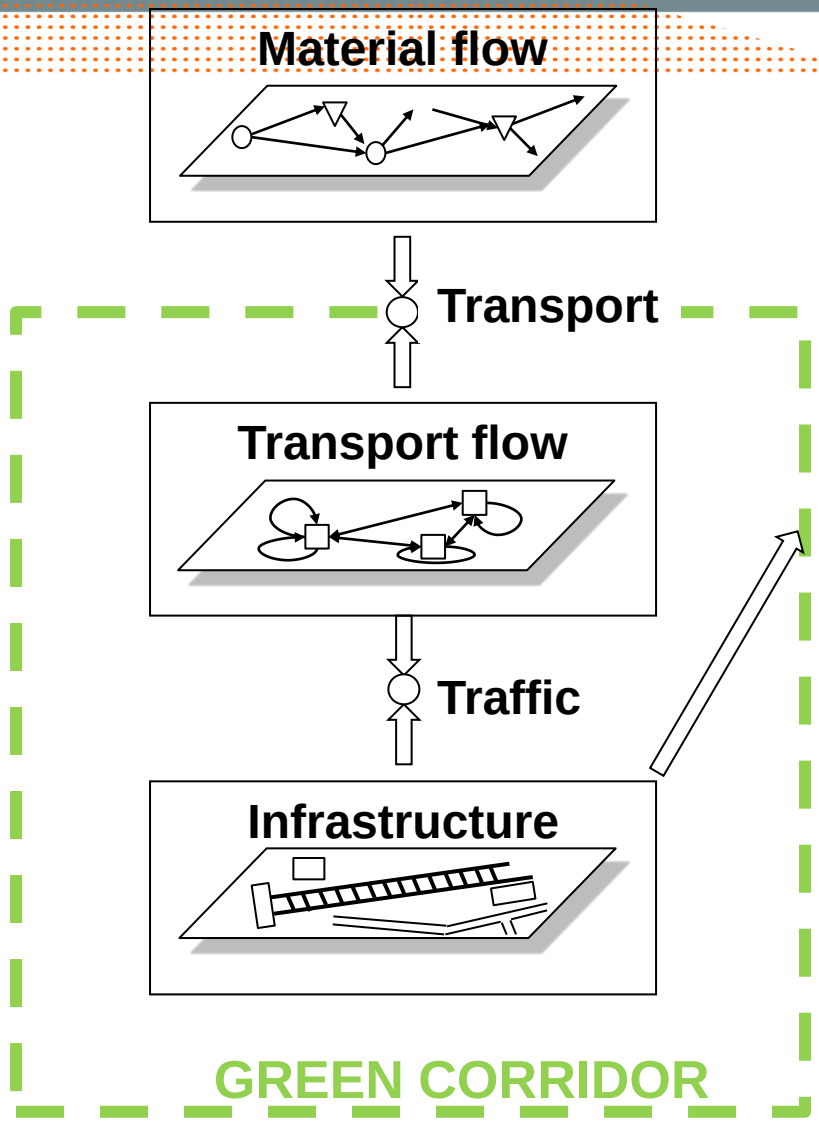


IAP Operating Model

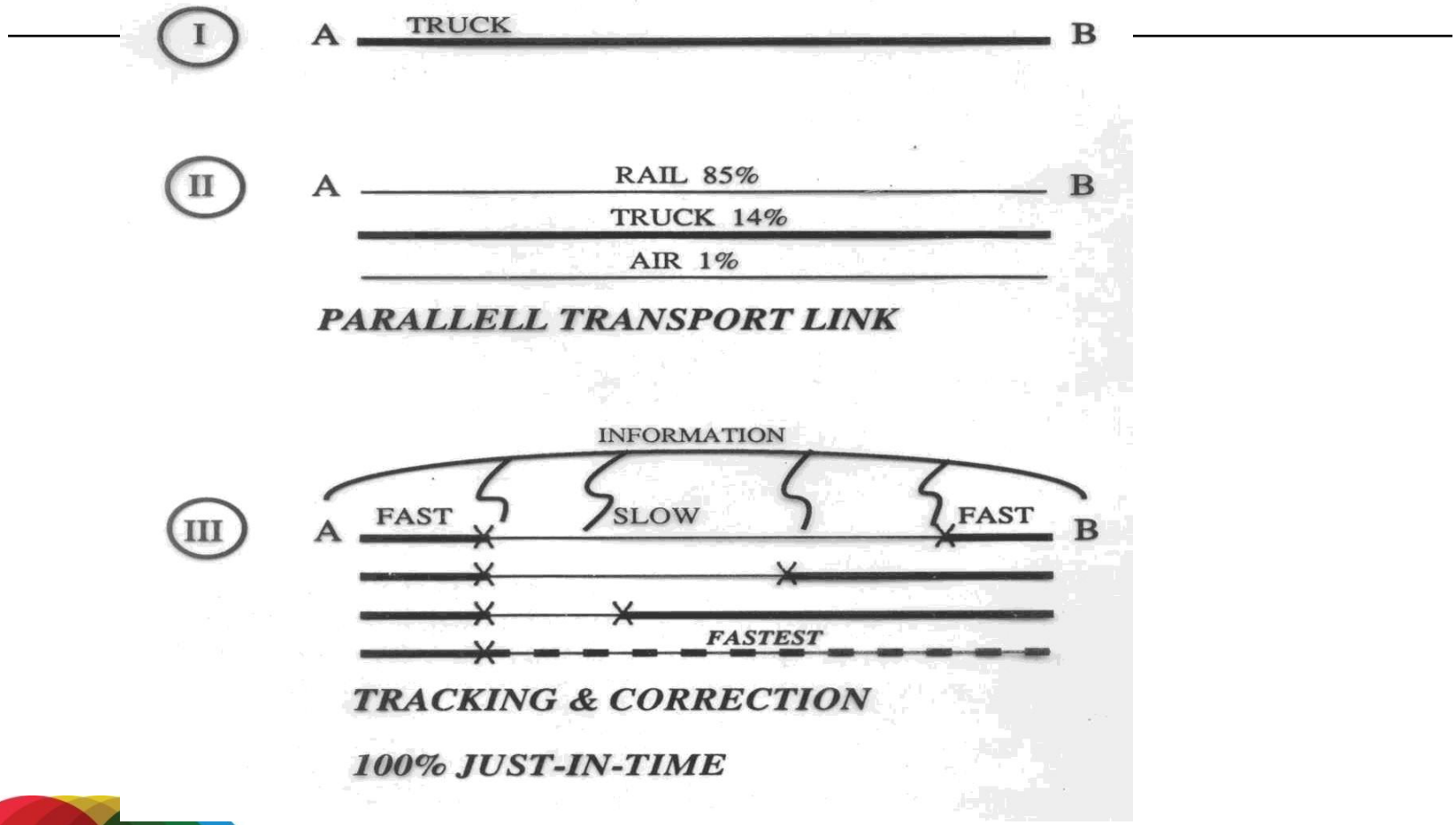


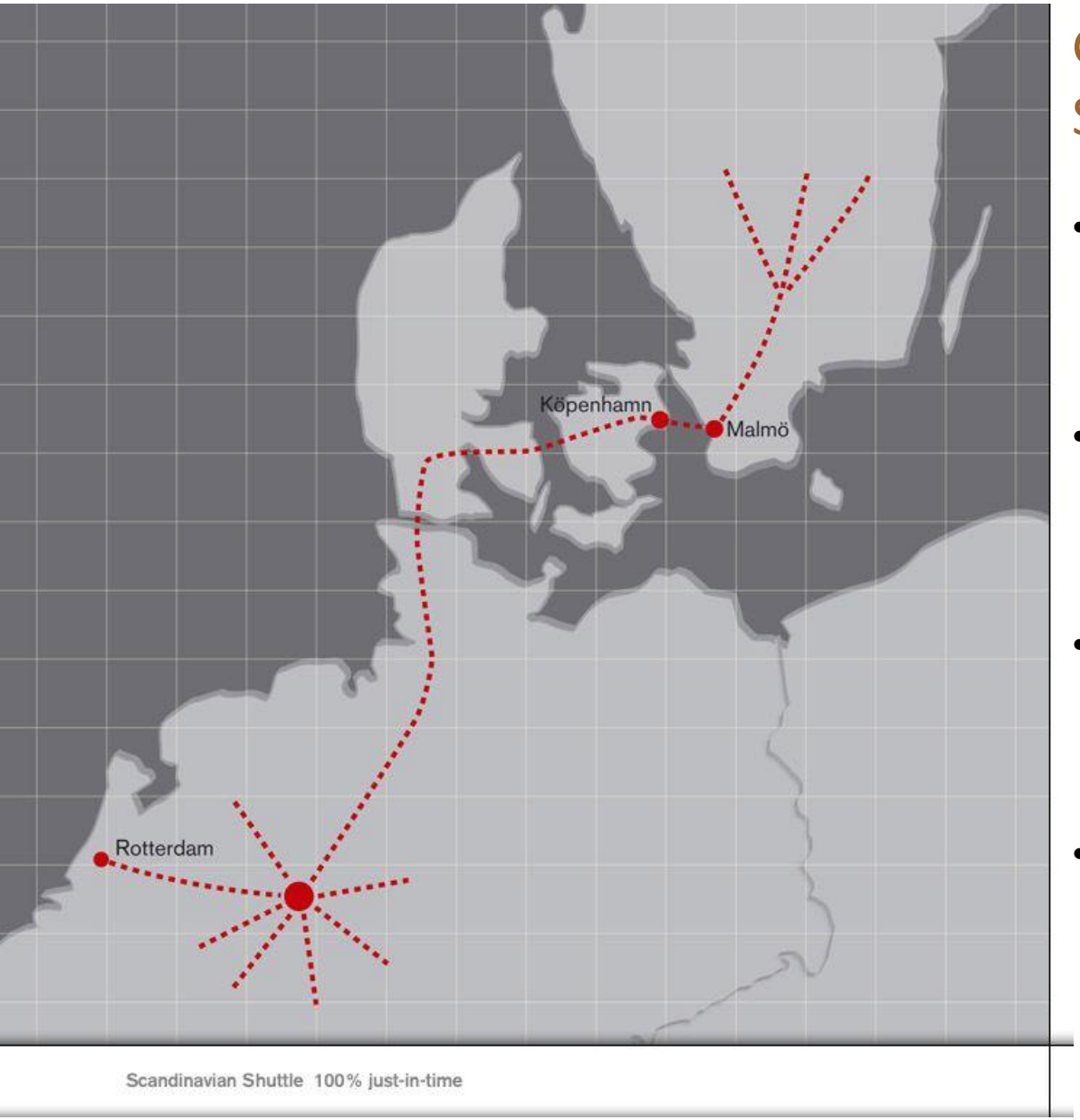


Note: European figure for freight includes all freight modes



Parallell & Sequential Co-Modal





Green Scandinavian Shuttle II

- Trucks to /from
  - Biofuel
  - 2 trailers isf 1
  - 35 m isf 18/25 m
- Trains
  - 72 vagons isf 36
  - 1.280 m isf 638
  - 160 km/tim isf 90
- Back up
  - Other train
  - Biotruck
  - 2 trailers
- Business model
  - Share train capacity risk
  - Several forwarders
  - A-modal offering
  - Warehouses both ends
    - Buffer
    - Cross docking

Framework to reduce GHG emissions from logistics and freight transport

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ECONOMIC ACTIVITY	INVERSE VALUE DENSITY	TRANSPORT INTENSITY	TRAFFIC INTENSITY	ENERGY INTENSITY	EMISSIONS INTENSITY

- **Technology?**
- **Behavior?**

Source: Fredrik Eng-Larsson

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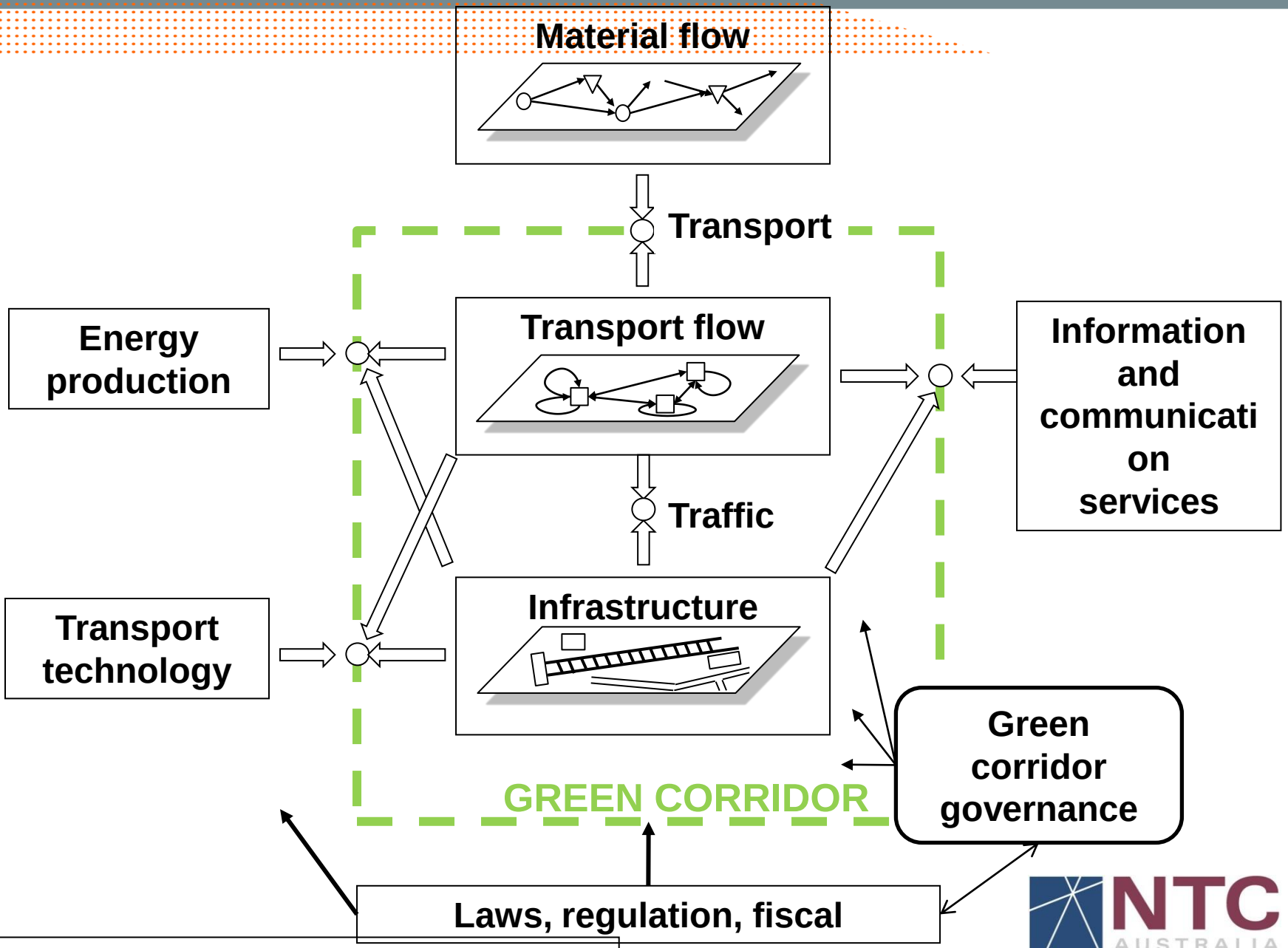

Questions?