



Growth Potential for Rail Freight in Short Distance Markets

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Growth Potential for Rail Freight in Short Distance Markets

INFORMS 2015, Philadelphia

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$$P(i|V) = \frac{\partial \ln G(e^V)}{\partial V_i} \int_a^b \epsilon \Theta^{\sqrt{17}} + \Omega \int \delta e^{i\pi} = \{2.7182818284\} \chi^2 \Sigma!$$

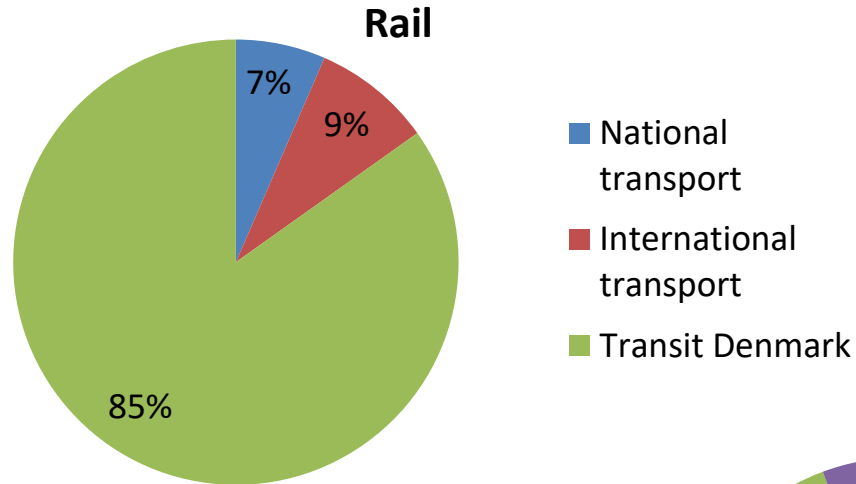
Short Haul Rail Freight

- Defined
- Cost Structure
- Functioning Routes Today
- Success Factors
- Further Research

Short Haul

- Small Flows Over Short Distances
 - SFSD
 - Less than 500 km, Bärthel & Woenius, 2004
- Dominant Mode: Road
- 46% of EU Transport
- Aarhus to Copenhagen, 307 km (land)
- Hamburg to Copenhagen, 472 km (land)

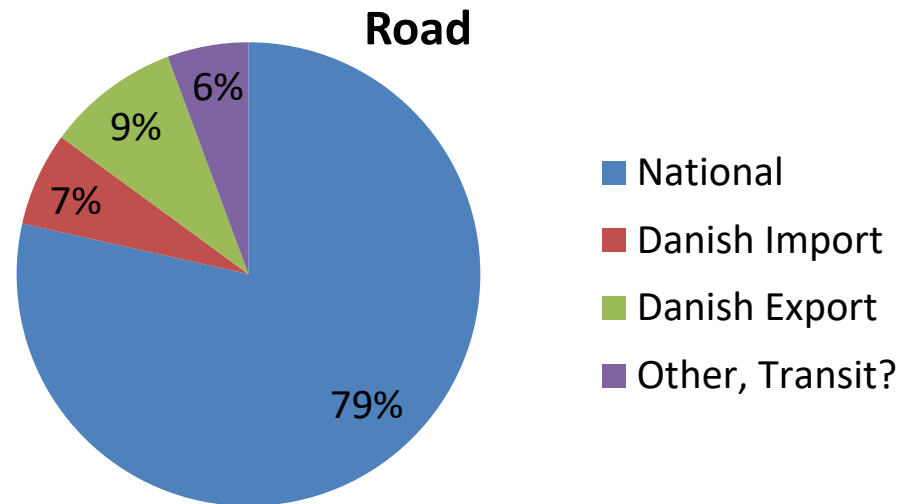
Rail Freight in Denmark



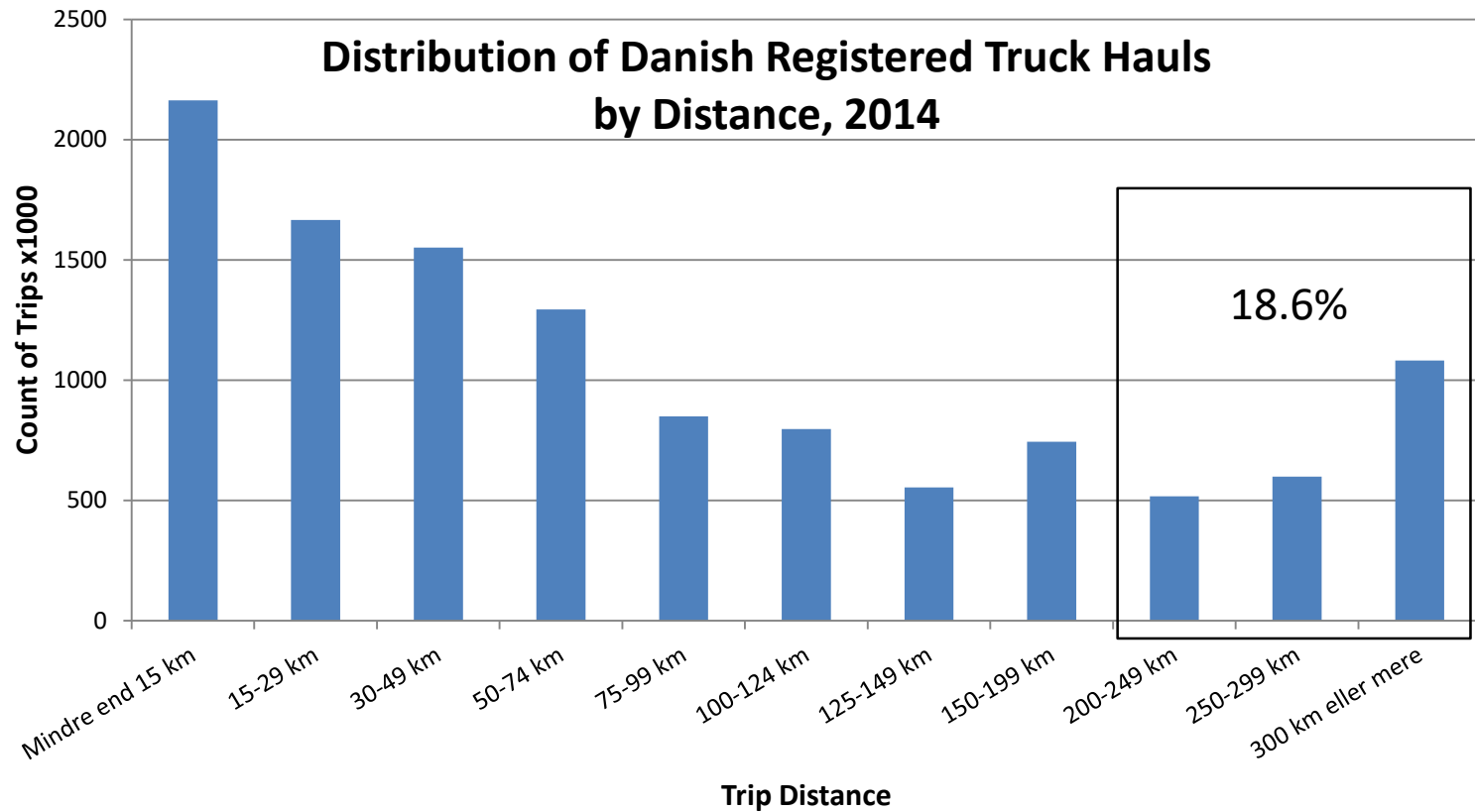
Unknown:

What is the distance distribution of the national traffic?

How much of "national" traffic is international connection?



Average statistics 2013 Q1 – 2015 Q2
 Danmarks Statistik, ton kilometers



*We do not have similar data for foreign trucks operating in Denmark

Short Haul Rail Modes

- Carload Freight (Enkeltvogn)



- Intermodal

– Trailer on Flatcar (TOFC)



– Container on Flatcar (COFC)

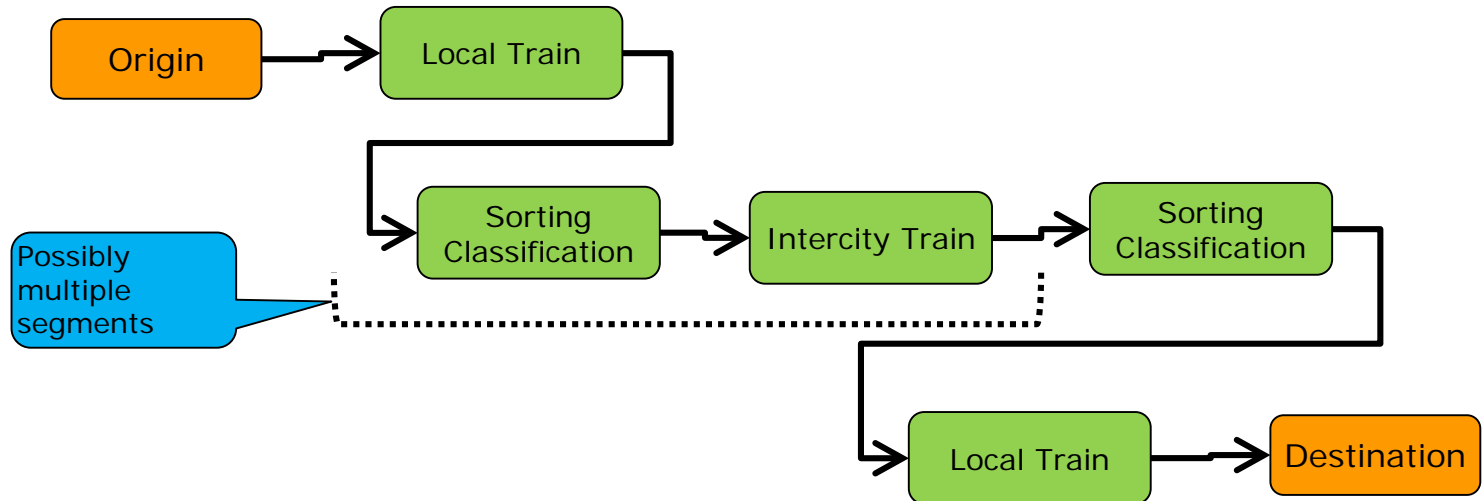


Popular Assumptions

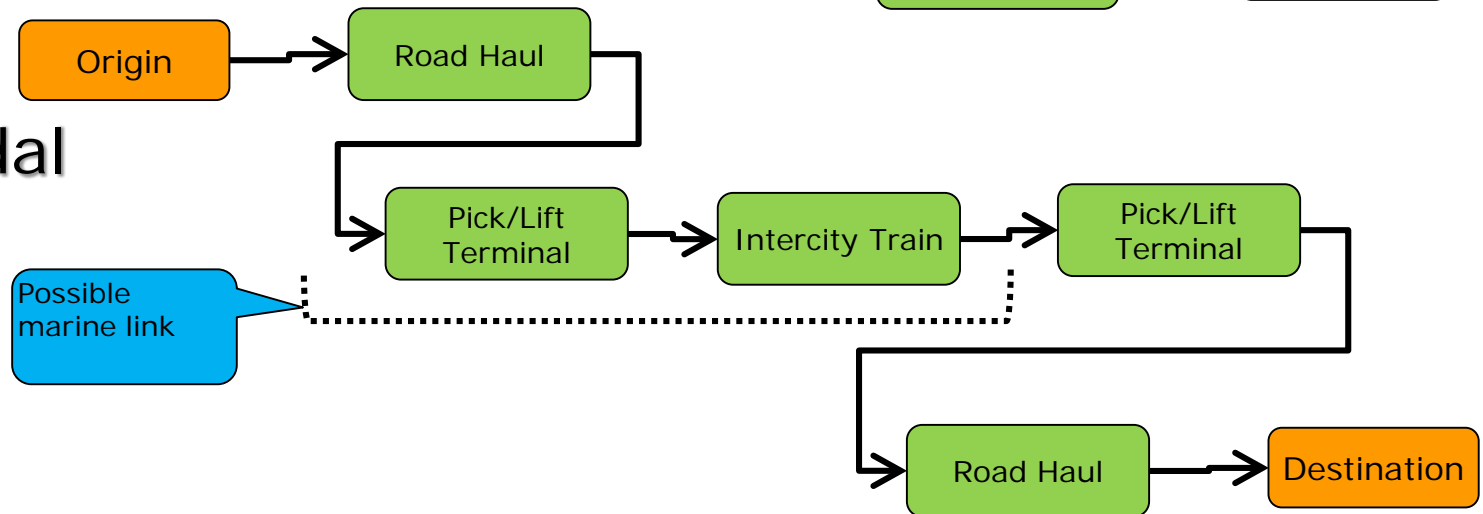
- Intermodal is
 - less expensive
 - less complicated
- Modern, successful services are pure intermodal
- Modern supply chain has no use for rail freight
- All of this is "proven"

Cost Structure of Modes

Carload



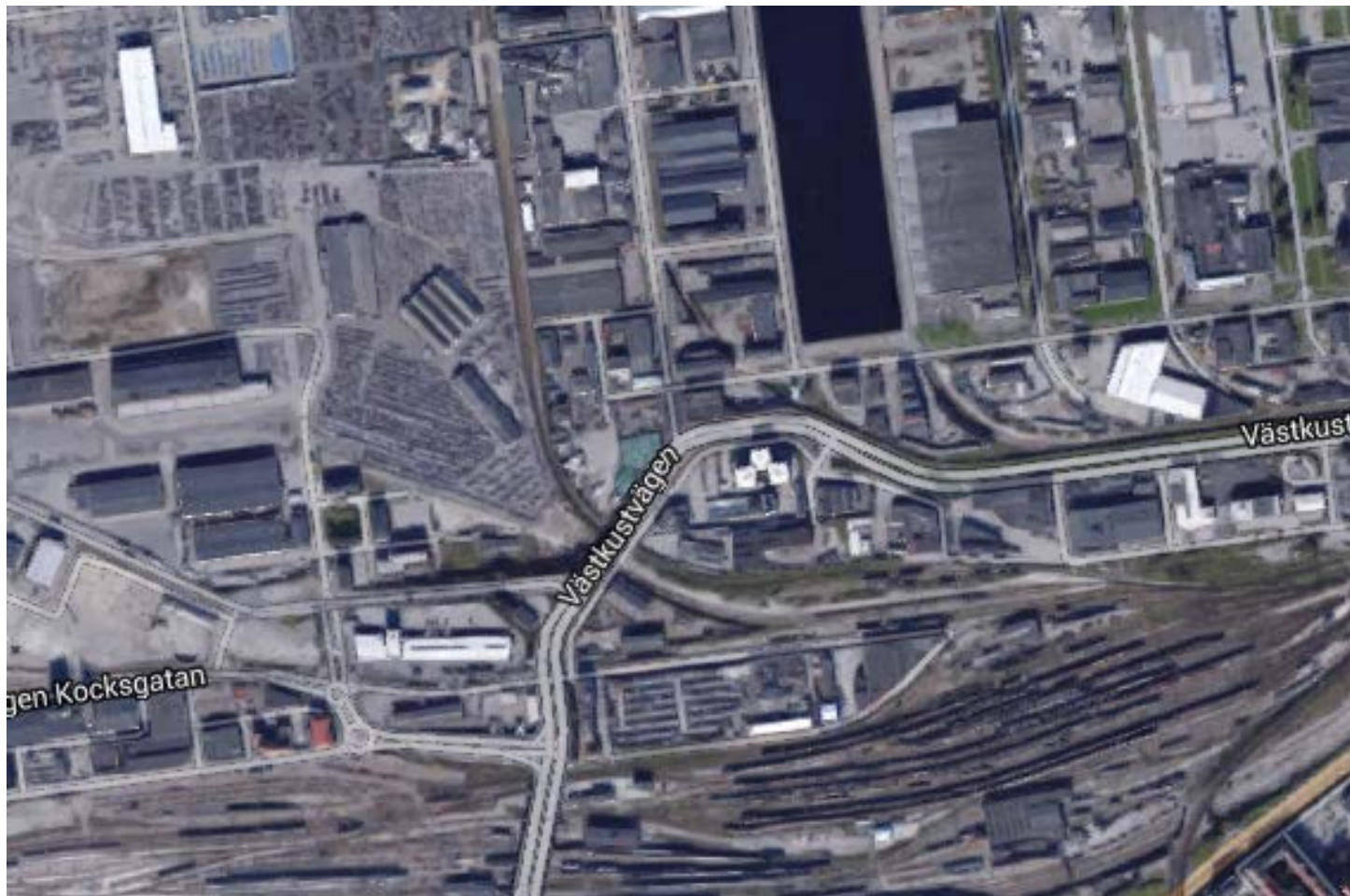
Intermodal



A Few Words on Carload

- Intermodal DOES NOT reduce the handling of freight
- Unknown: What is the equivalent cost traffic level between intermodal and carload?
- Greatly ignored in Denmark
 - A victim of bad service
 - Nearly all private freight sidings in Denmark are out of service
 - Needs to be evaluated separately
- Carload still represents 50% of volume in European Union (EU 27)*

How Do You Explain This?



And This,



And This?



The Road Competition

- Driving hours a significant factor
- EU regulations allow 9-10 hours of driving per day
 - A roundtrip Aalborg to Malmö (2x 343 km, ferry)
 - A roundtrip Aalborg to Hamburg (2x 447 km)
 - NOT Hirtshals to Hamburg (2x 513 km)
 - NOT Malmö to Stockholm (2x 613 km)
- Rail becomes time competitive when journeys require driver rest

Pricing in Denmark

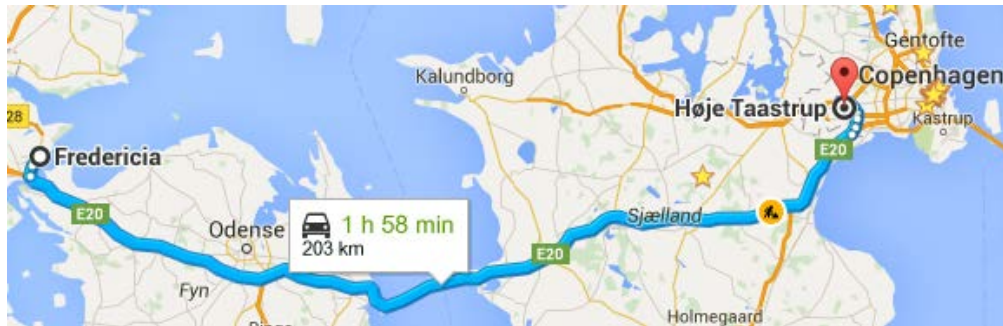
- Road haul, 7 DKK/km (foreign driver)
- Rail haul, 3,5-4,5 DKK/km
- "Lift" trailer, 300 DKK
- Local trailer haul, approx. 800 DKK
 - 25 km (Høje Taastrup to Amager, Lyngby)
 - 35 km, Høje Taastrup to Nordhavn
 - 48 km, Høje Taastrup to Hillerød
 - 32 DKK/km (Danish driver)
 - Includes significant idle time
- Total terminal costs, 2200 DKK
 - About 700 km break even
 - Often more than the rail haul cost

Some Short Haul Rail Systems

- Port of Gothenburg
 - On dock rail loading
 - Traffic less than 500 km
 - 121 trains per week (daily service)
- Carlsberg Beer Train
 - Fredericia to Høje Taastrup
 - 203 kilometers, 10 trains per week, 300 trailers
 - Saves 800 DKK toll* each direction
 - *Carlsberg owns Fredericia "terminal"*
- Florida East Coast
 - Jacksonville to Miami, Florida
 - 556 kilometers (short by American standards)
 - Most traffic continues long distance by road

*estimated discount

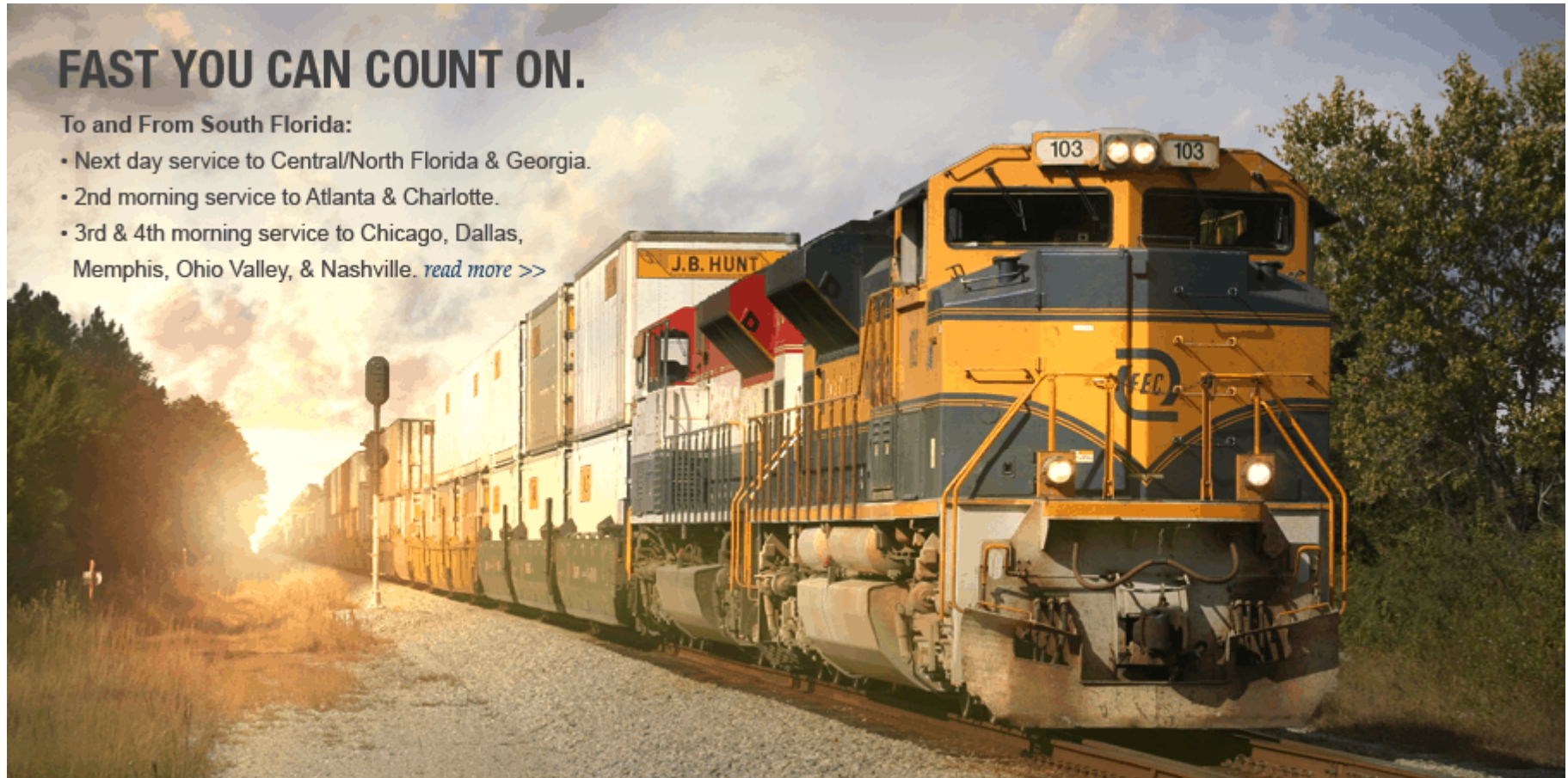
The Routes



FAST YOU CAN COUNT ON.

To and From South Florida:

- Next day service to Central/North Florida & Georgia.
- 2nd morning service to Atlanta & Charlotte.
- 3rd & 4th morning service to Chicago, Dallas, Memphis, Ohio Valley, & Nashville. [read more >>](#)



The American standard, not feasible in Europe due to electrification catenary.



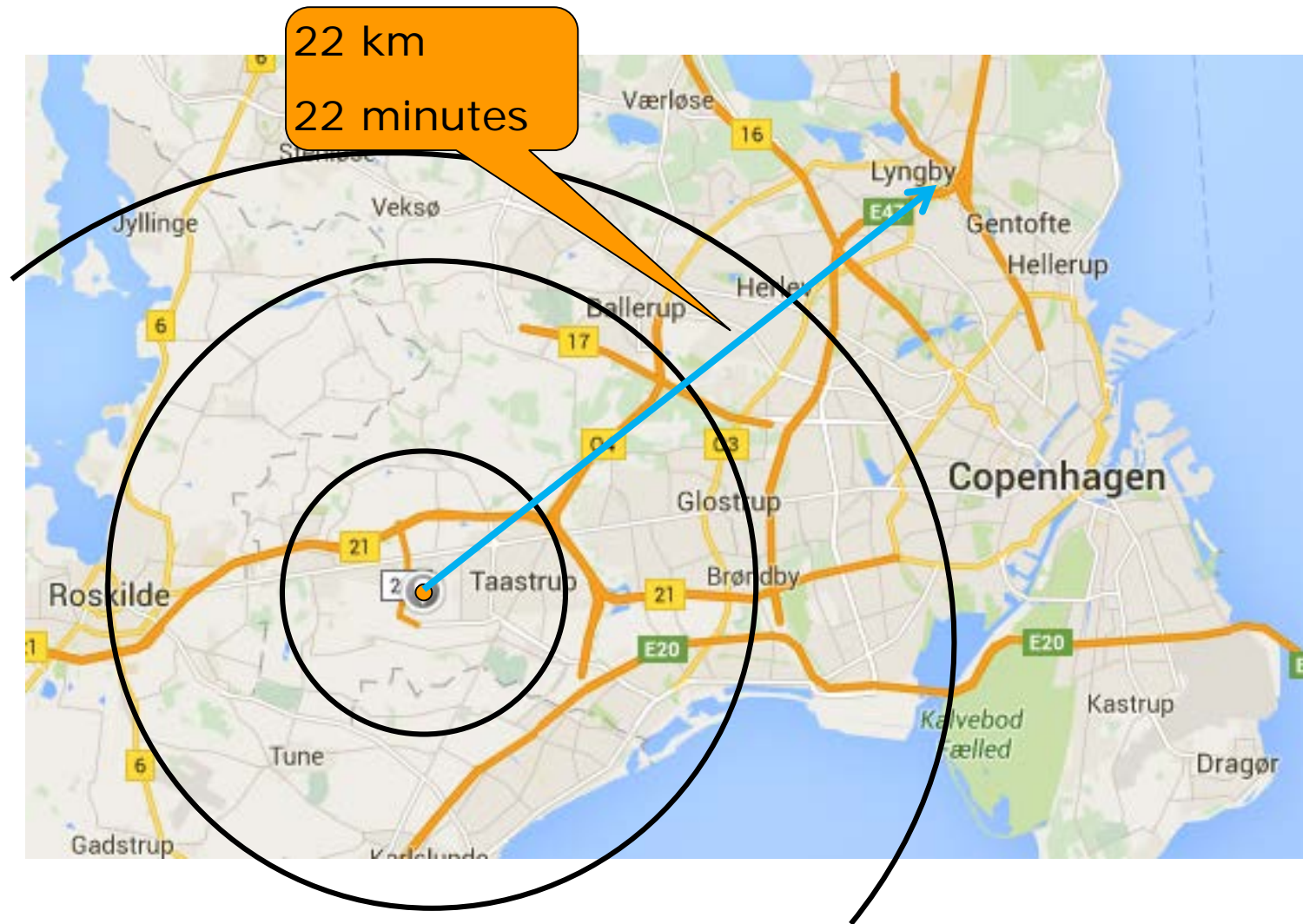
Note

- Length of tracks
- Active loading as well as storage
- Proximity to city

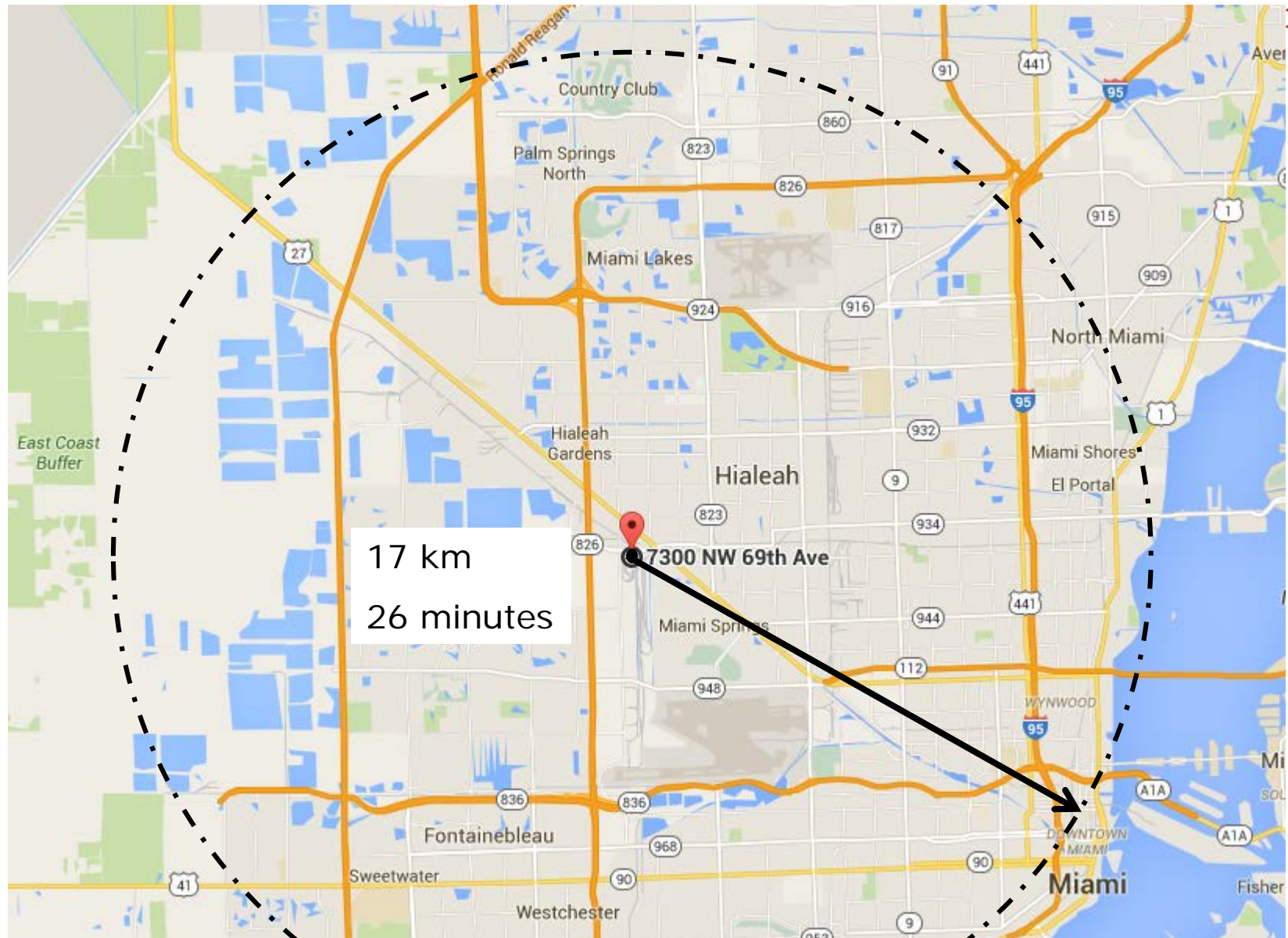


Terminals Drive Success

- More than half of the cost
- Placement in network flow critical
 - Close to origin/destination – or –
 - As part of optimal road haul route plan
- Efficient “lift” necessary
 - Fully utilized facility, lower unit cost
 - Regular, evenly distributed traffic
- Low cost local road haulage
 - Minimize haulage distance
 - Plan trips to minimize non-revenue distance
 - Fully utilize vehicle fleet



København has a low density of industrial development

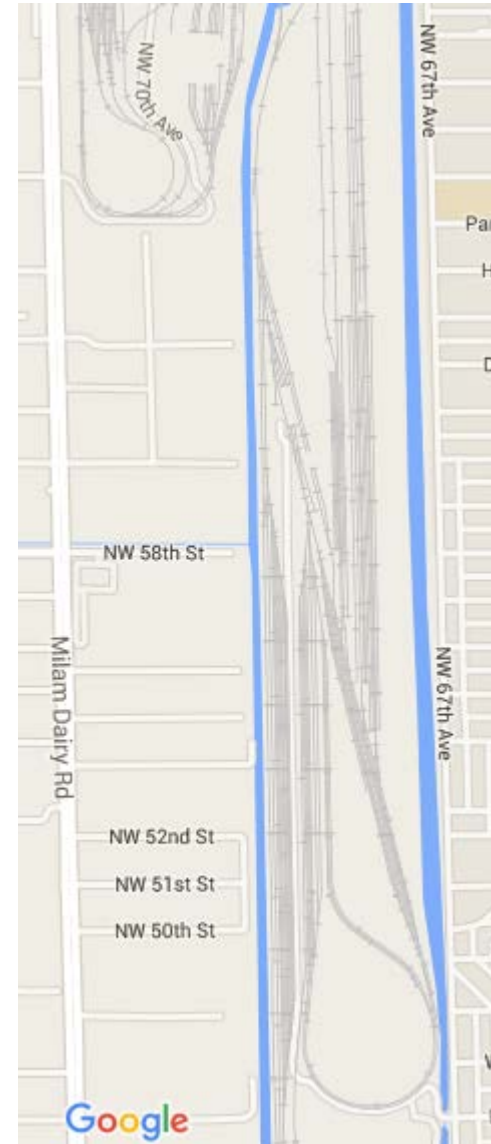


Terminal Design for Low Cost



DB Schenker
Høje Taastrup
(København)
BAD

Florida
East
Coast
GOOD



Terminal Efficiencies

- Better utilization of terminal
 - Higher volume, higher utilization
 - Lower unit cost
- More efficient local haul
 - Scheduling of routes
 - No waiting delivery
 - Coordinate separate delivery and pickup trips
- Significant economies of scale
- Eliminate the terminal
 - Carload freight
 - Direct shunting of container to customer

Gothenburg



Sådan!

- This is not intermodal
- At Frederica, this is carload freight
- If this is the success story...
 - More private sidings should be encouraged
 - Intermodal should be re-defined



Lessons

- Success in short distance rail freight frequently means some components of carload freight
- Origin or destination is a private siding
 - No road haulage
 - No terminal transaction or agent fees
 - Port of Gothenburg, on dock rail
 - Carlsberg, origin is customer siding
- Specifics of intermodal advocacy should be adjusted

Research Ideas

- Optimal Location of Terminals
 - Minimize local haul
 - Optimal transport network
- Optimal Intermodal Service Design
 - Consider freight flows
 - Consider driving hours regulations
- Terminal Management
 - Optimal local haul planning
 - Optimal flow and process time
- Economies of Scale
 - Estimate and forecast cost reductions from volume increases, new business

Unknowns, Research Ideas?

- What is the distance distribution of the national traffic?
 - How much is viable for short distance rail?
- Can we forecast viable rail services from economic and freight flow data?
 - Can we identify opportunities?
 - Can we influence policy?

Summary

- Short haul rail freight succeeds with elements of traditional service
- Too much policy is based on
 - Subjective opinion
 - Inaccurate perception of service structure
- Opportunities for
 - Applied research
 - Consulting
 - Education programs in supply chain
- Active topics of interest at DTU Transport

Thank You

