UIC ENERGY EFFICIENCY DAYS 2014

ANTWERPEN, 16 - 19 JUNE

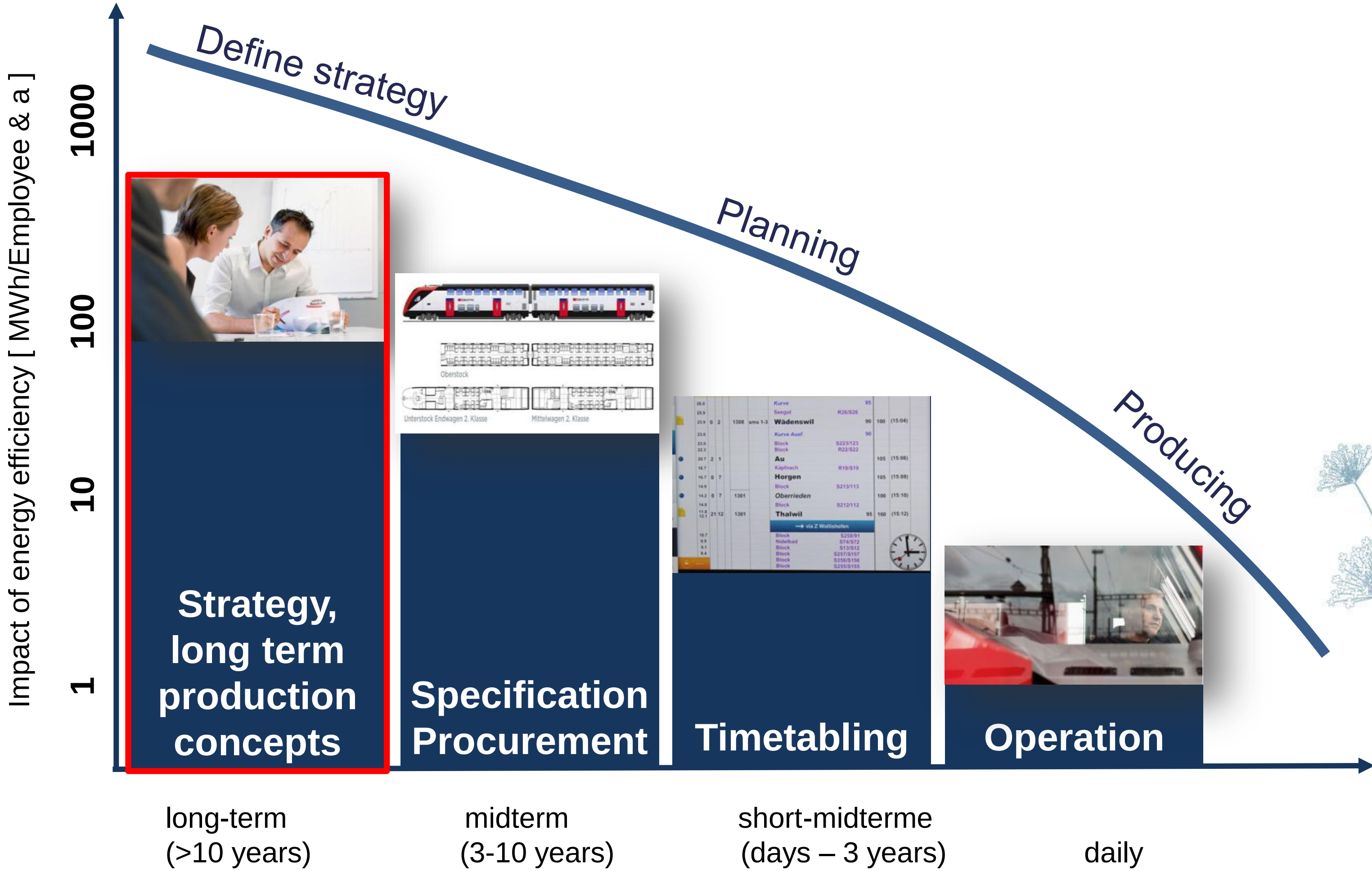
ENERGY EFFICIENCY IN PLANNING

INFLUENCING ENERGY EFFICIENCY AT AN EARLY STAGE

MATTHIAS TUCHSCHMID, ENERGY MANAGEMENT SBB

Energy Efficiency, the best fuel to move our trains!

Biggest influence on energy efficiency is at early stage of strategy and planning.



Focus Of Workshop

How to influence today the railway of tomorrow?

Is energy management actively involved in the planning process?

What are the prioritized activities?

What are success stories?

What are favorable / obstructive factors?

What are typical time frames for planning process in your railway? (network layout, basis production concept, number of trains, defined vehicles)

AGENDA

Time	Topic
14.30 - 14.35	**Introduction**
14.35 - 14.50	**Part Ia: Input presentation GEN** «Energy data analysis as a basis for prioritizing long-term energy efficiency measures»
14.50 - 15.05	**Part Ib: Input presentation SBB & ProRail** «Influencing Energy Efficiency at early Stage»
15.05 – 15.25	**Part II: Group Work & Presentation** Discussion in small groups of 4-5 participants made experiences and sharing the knowledge.
15.25 – 15.55	**Part III: Plenum** Presentation of the findings of Part II in the plenum. Open discussion about the energy efficiency in Planning processes: What are favorable factors? Obstructive factors? What are transferable success stories?
15.55 – 16.00	**Summary and Closing**

ENERGY EFFICIENCY IN PLANNING

ENERGY DATA ANALYSIS AS A BASIS FOR PRIORITIZING LONG-TERM ENERGY EFFICIENCY MEASURES

WESSEL SLUIS, GEN

Power - Gas - Renewables
Covered for change

Energy Data Analysis
as a basis for prioritizing energy efficiency measures

27 Mei 2014

Michiel Dorresteijn

Nabi Abudaldah

Introduction GEN

Power - Gas - Renewables
Covered for change

- Founded in 1997, still under same independent ownership
- Knowledge company exclusively focusing on gas, power, heat and water
- From strategy to process improvement and detailed software implementation
- Geographical area covers primarily NWE
- Nearly 50 highly educated staff, all energy specialists
- HQs: Utrecht (NL) + local representatives in BE, DE, UK (FR in progress)

Outside Temperature

Traction energy shows a strong correlation with outside temperature, especially when working days and weekend days are separated

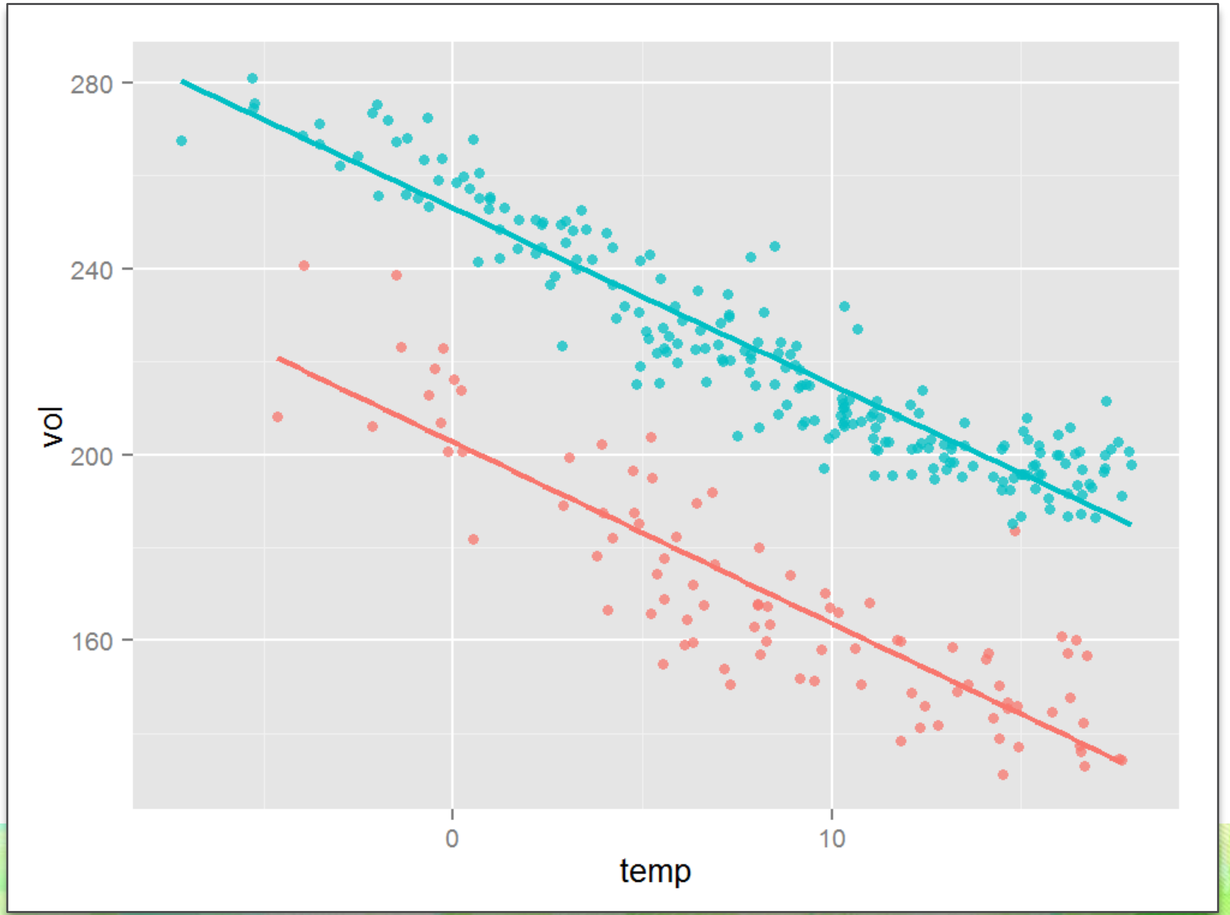


Figure: Mean traction energy per 15-minute-interval for all grid connections against the outside temperature at meteostation De Bilt.

Blue: working days
Rood: weekend days

Daily pattern of temperature influences

The temperature dependency varies over the mean day:

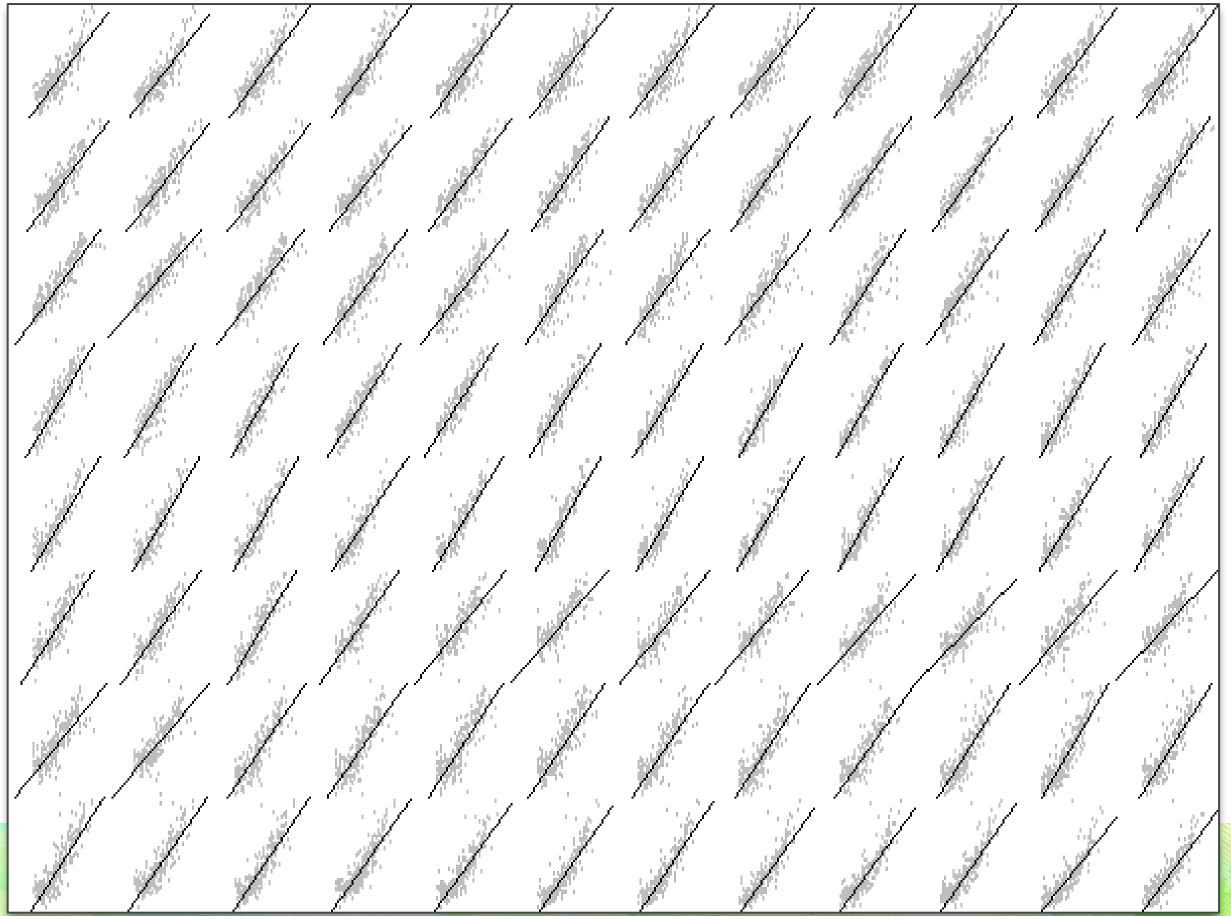
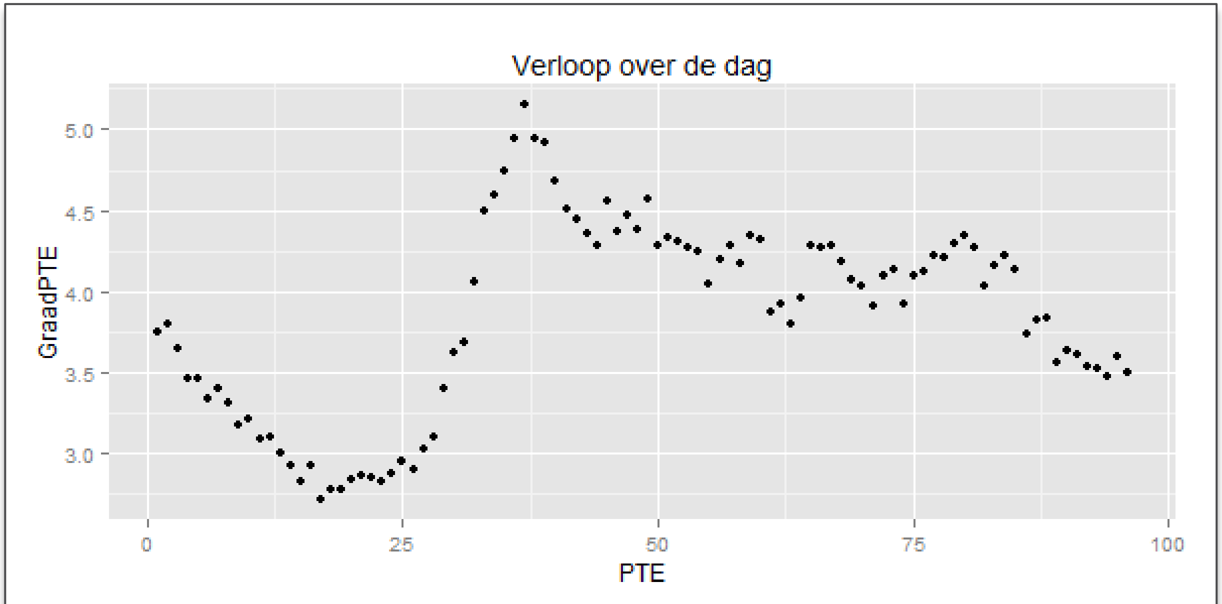


Figure: the mean consumption per 15-minute-interval for all working days for all grid connections against the mean temperature for that interval

Daily pattern of temperature influences

Power - Gas - Renewables
Covered for change

The temperature dependency varies over the mean day:



00:00 06:00 12:00 18:00 24:00

Figure: the found temperature dependencies over the mean working day

Dataset: exploration

Geographic distribution of grid connections in proportion with the yearly volume of the grid connection.

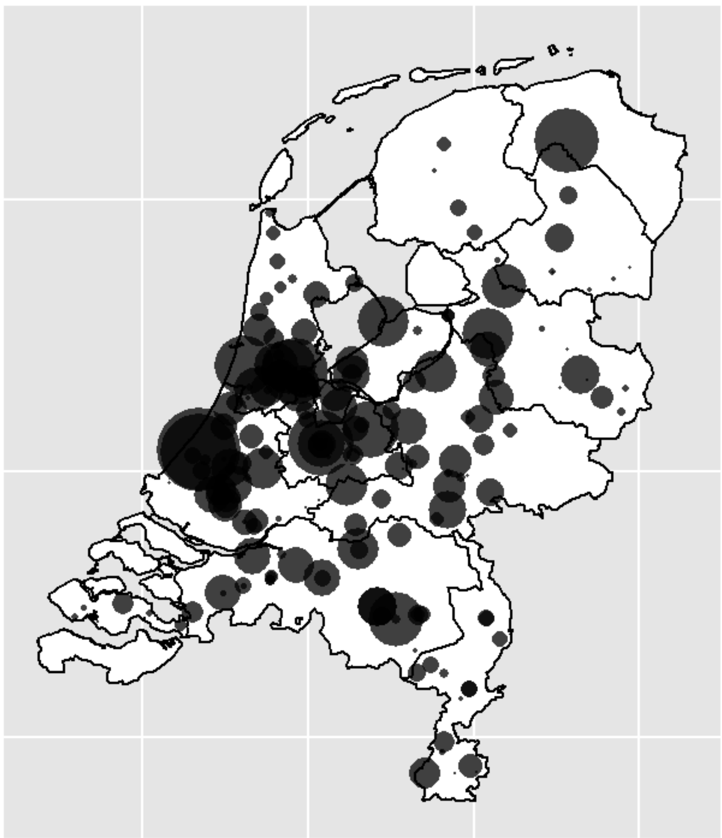


Figure: the geographic locations of the grid connections. A larger circle means a larger yearly volume.

Dependencies per cluster

Power - Gas - Renewables
Covered for change

Three separate clusters can be found statistically with different temperature dependencies:

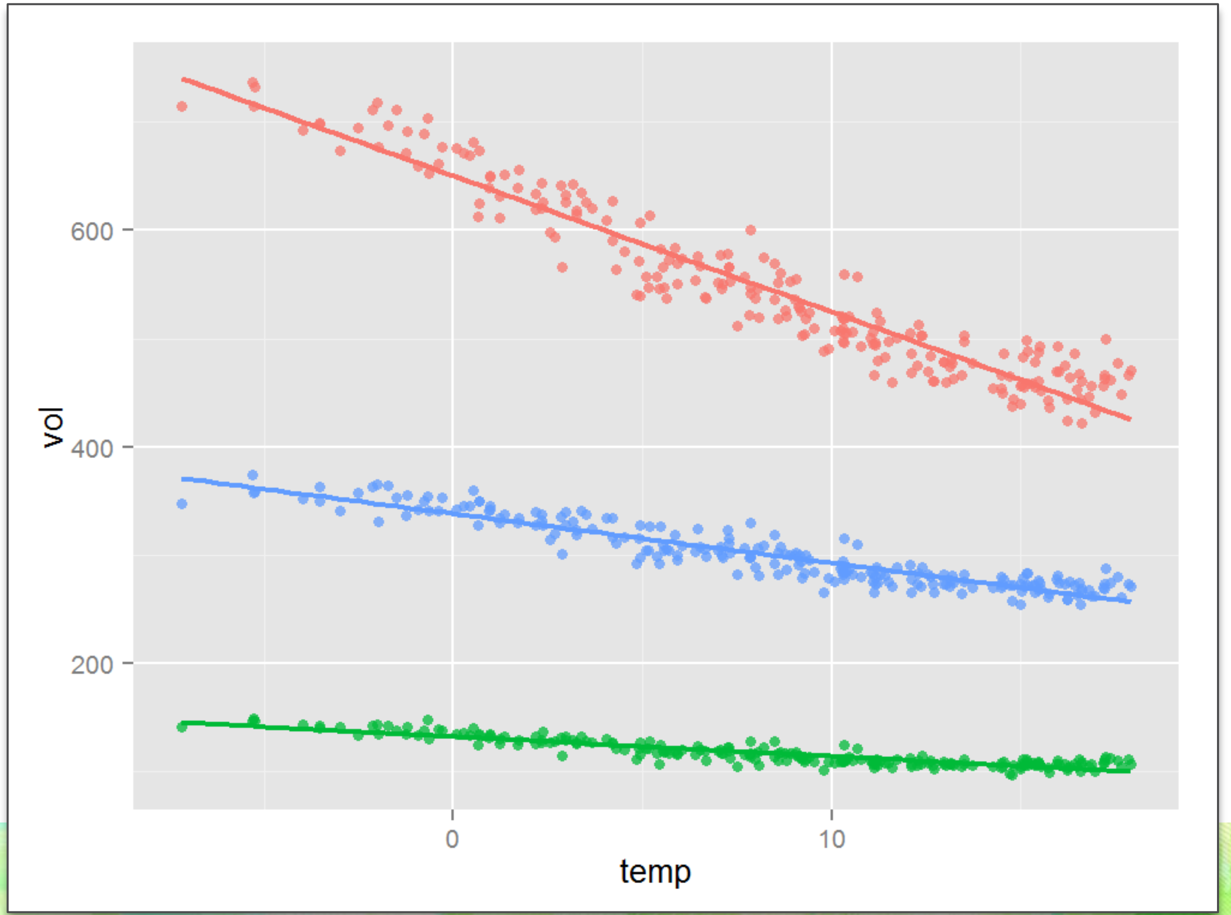


Figure: per cluster the mean volume per 15-minute-interval on working days for all grid connections within that cluster against the temperature during that interval as measured at De Bilt.

Differences per cluster

The identified clusters seem to be related to the ‘opstelplaatsen’

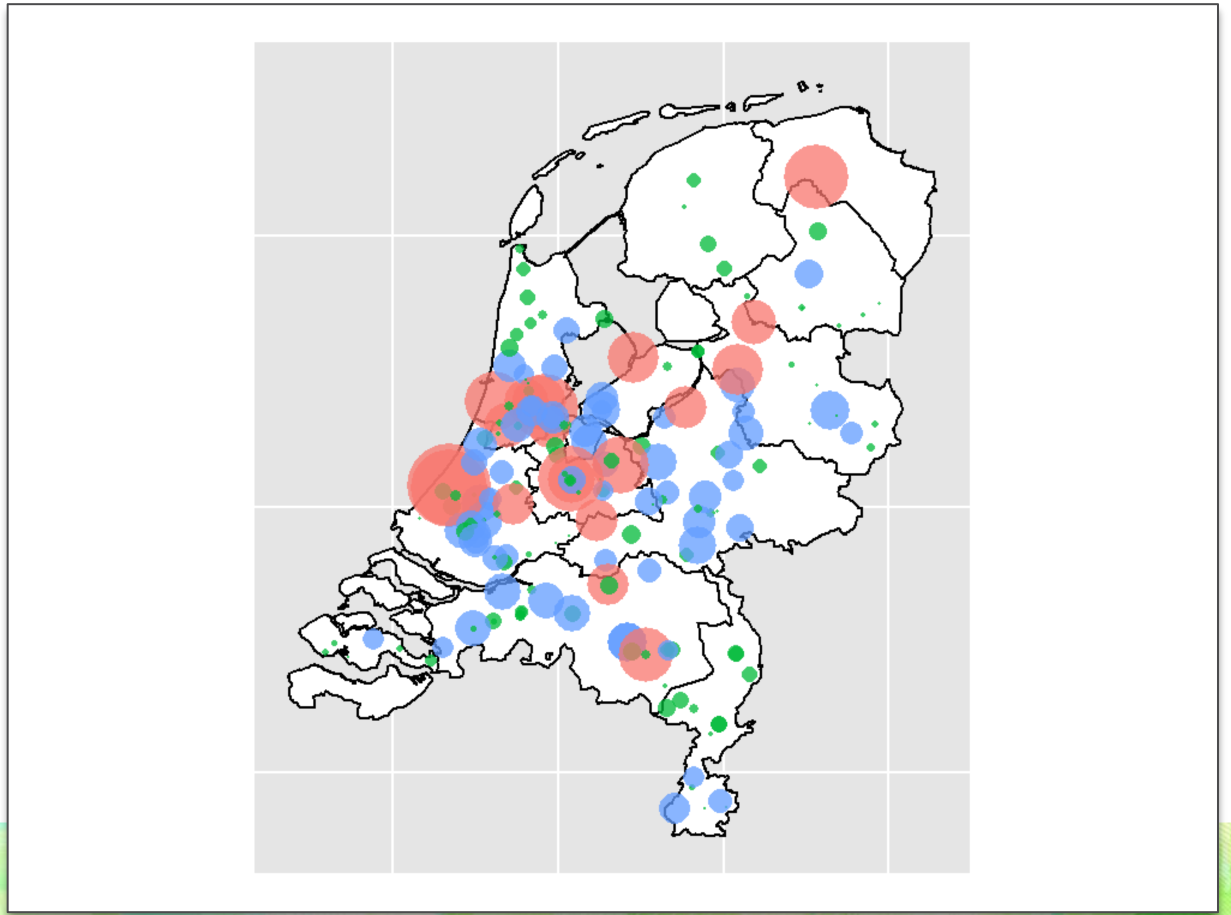


Figure: the total yearly volume per grid connection in proportion with the size of the symbol. The color corresponds with the clusters indicated on the previous slide.

Other explorations

- Dependencies vary per geographical region
- Dependencies vary per month and season

- It can be concluded that energy data contain a treasure of information that can help to identify the energy efficiency measures that will have the highest impact.

INFRABEL UIC

UIC Energy Efficiency Days 2014

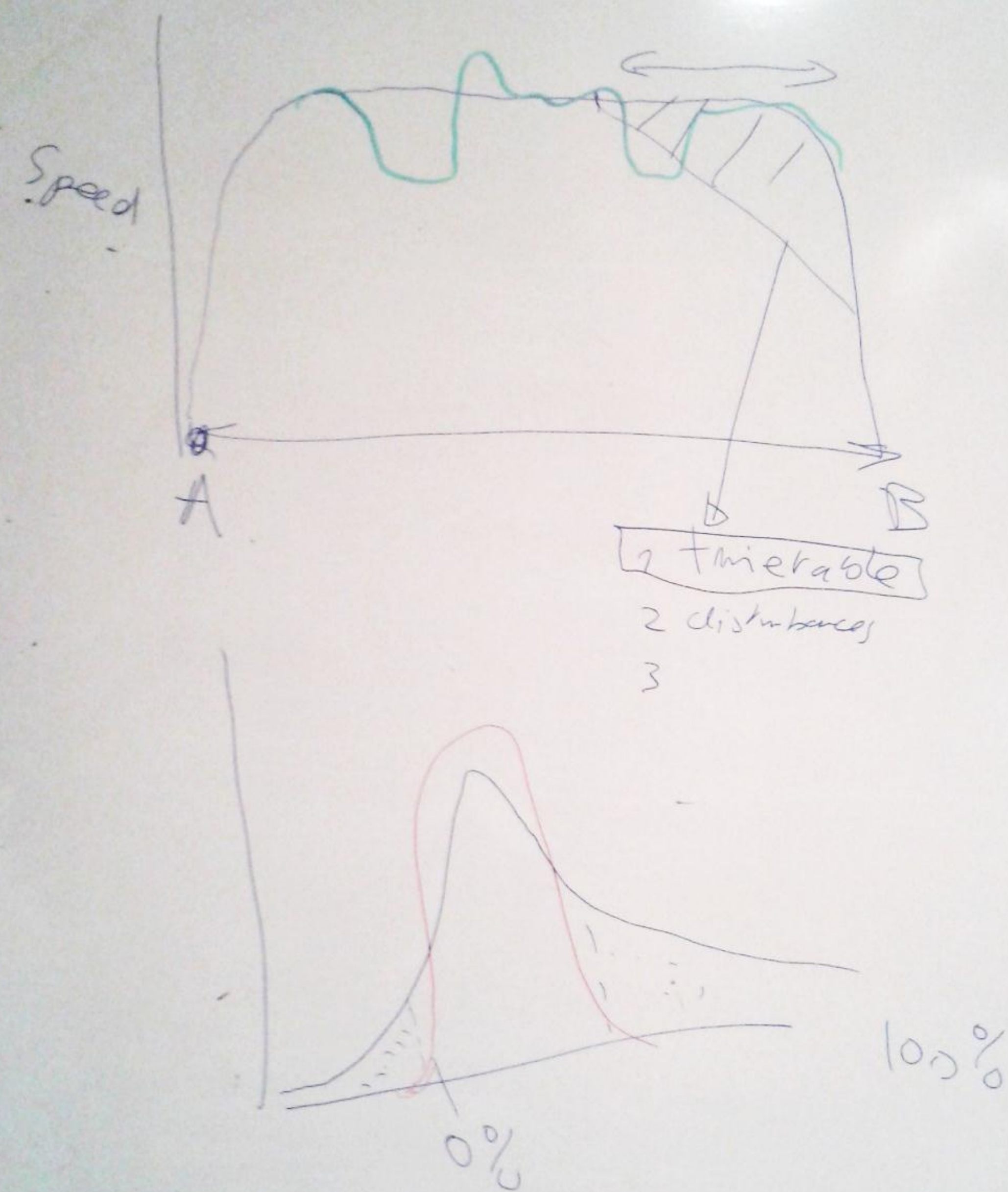
Antwerpen, 16 - 19 June

Energy efficiency in planning

Influencing energy efficiency at an early stage

Paul van der Voort
Programm Manager Innovation, ProRail

Energy Efficiency, the best fuel to move our trains!


Speed
A
B
1 tolerable
2 disturbances
3
0%
100%

INFRABEL UIC

UIC ENERGY EFFICIENCY DAYS 2014

ANTWERPEN, 16 - 19 JUNE

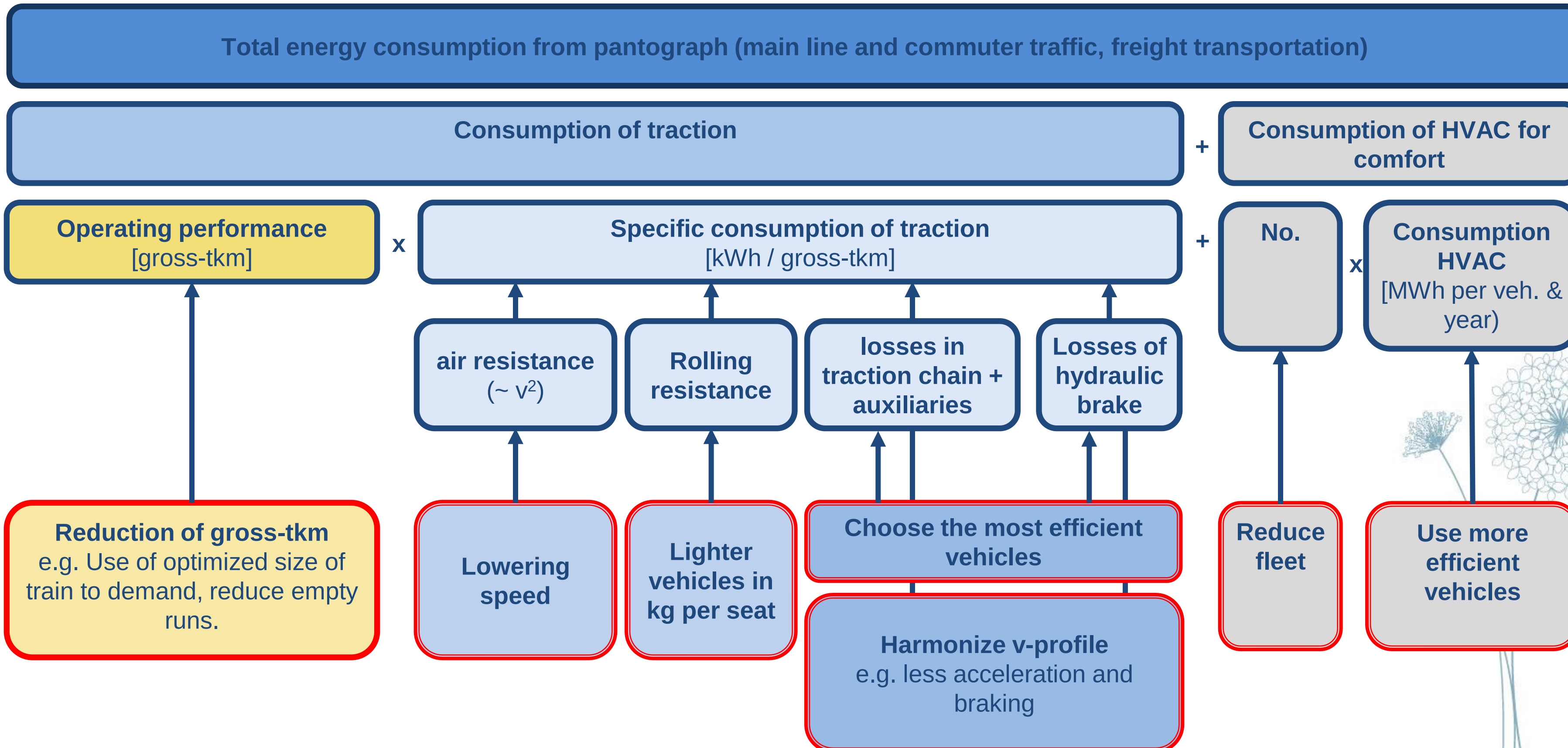
ENERGY EFFICIENCY IN PLANNING

INFLUENCING ENERGY EFFICIENCY AT AN EARLY STAGE

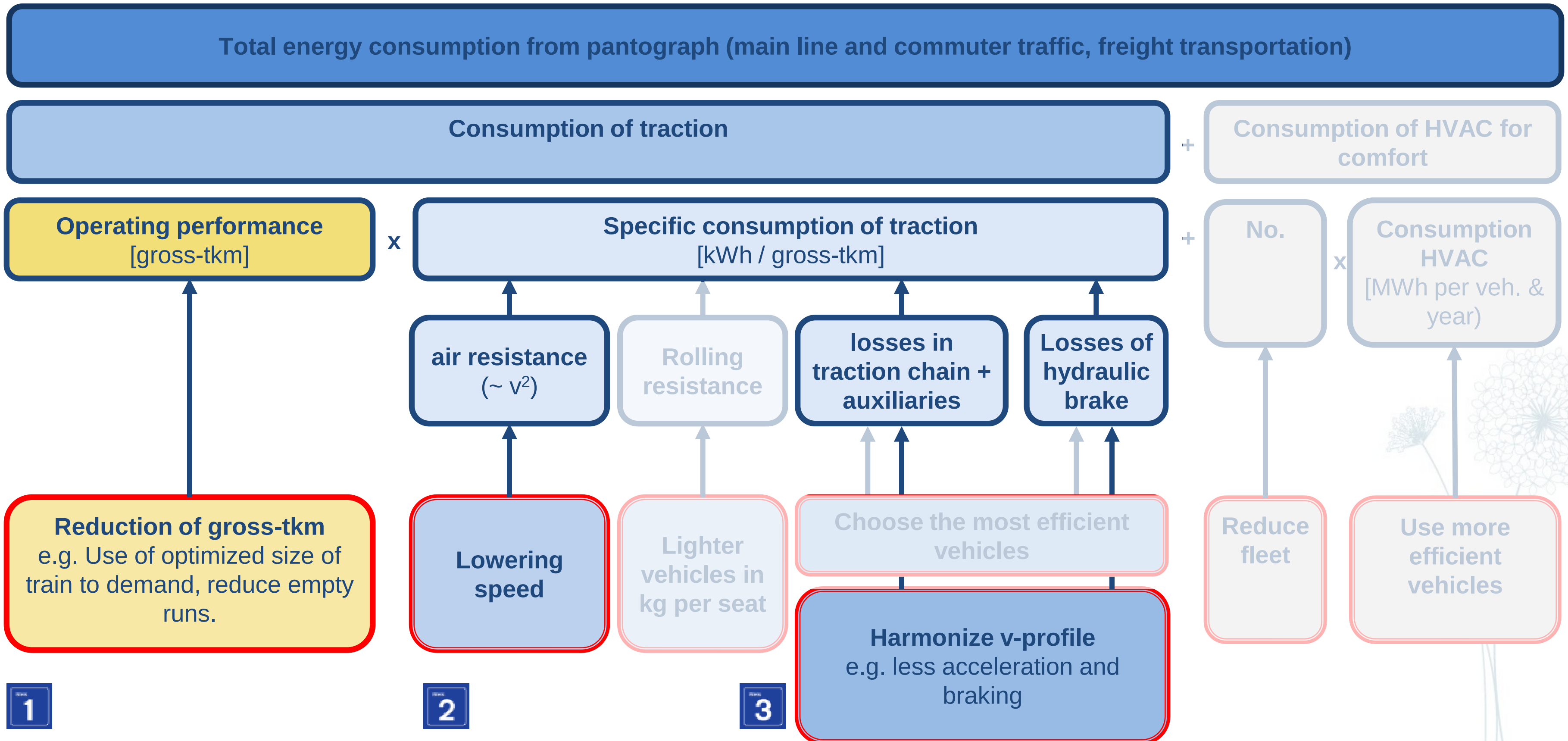
MATTHIAS TUCHSCHMID, ENERGY MANAGEMENT SBB

Energy Efficiency, the best fuel to move our trains!

INFLUENCING FACTORS ON ENERGY CONSUMPTION



Starting Points for Influencing the Energy Efficiency at Early Stage



REDUCTION OF GROSS-TKM

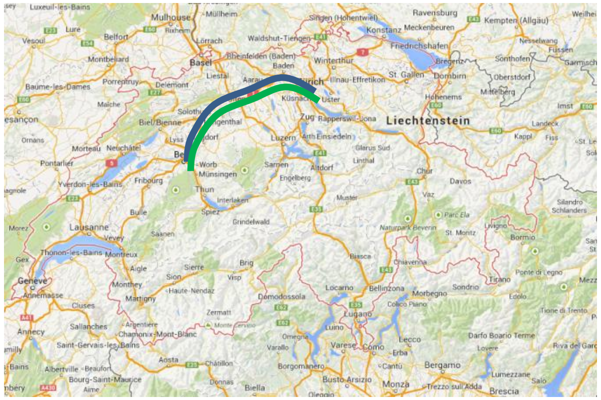
1

e.g. Optimised train sizes.

Adjusting train size to demand, by using smaller trains for regional traffic on long distance traffic routes at off-peak hours.

Optimising routes in network.

e.g. avoiding parallel routes with low load factor in off-peak times (e.g. parallel IC and Regio)



LOWERING SPEED

2

Reducing speed reductions at infrastructure

longer running times (1 minute) to reduce peek speed peaks

stops on request

Shorter stopping times in train station in off-peak hours.

Streckentabelle A-Stadt – E-Dorf

Weichen, Pfeiftafel, usw.		km	Neigung in ‰		Zugreihen		A			D
km-Lage			+	−	Bremsverhältnis in %		50	40	30	v_{max}
		0			**A-Stadt**	30	30	30	30	30
km 0.68	Weiche									
					km 0.70		50	40		50
					km 1.20			50	50	
			10	17						
					km 1.70		40	40	40	40
km 1.75	Weiche									
km 2.65	Weiche									
					km 2.70		50	50	50	50
		3.96			↑↓ **B-Dorf**	30				
	2		13	5						
		6.08			↑↓ **C-Dorf**	30				
			13	10	*D-Dorf*					
		9.62			⊥ **E-Dorf**	30				

Harmonize V-Profile

3

e.g. Priorities in planning.

Currently, the priorities of planning are as follows: First comes the main lines, then commuter traffic and third freight trafic. This leads to several planned and unplanned stopps of heavy freight traffic (>1000t!) with energy losses, because a light commutter train has a higher priority.

These stops of heavy freight trains can be reduced, if the traffic is priorized according to the average speed.

.

Part II: Discussion in Groups (20')

Discuss in a group of 4-5 participants the following questions and save your results on a flipchart.

1. Is energy management actively involved in the planning process?
2. What are success stories?
3. What are favorable / obstructive factors?
4. What are typical time frames for planning process in your railway? (network layout, basis production concept, number of trains, defined vehicles)

UIC ENERGY EFFICIENCY DAYS 2014

ANTWERPEN, 16 - 19 JUNE

PART III: PLENUM (35')

Energy Efficiency, the best fuel to move our trains!

Results of group 1

(1) Plng takes en-eff. into acct.

NMBS/SNCB : it is the last factor taken into account, in the end not an item in decision to drive train.
- pax
- material
- personnel
- (energy :)

NS: - it is taken into account. (slack / slack distr. for ECO driving).
- priority to stability / punctuality
- optimisation also based on energy.

(2) Joint goals ProRail (INFRA), NS (TOC) for improvements "on the interface"

- NMBS: balance (contact) speed (more) & frequency, # of stops / etc

"It is on the agenda now!"

(3) . Conservatism @ planning dept, culture.

. Commercial & political constraints

Long lead times for infra changes / rolling stock.

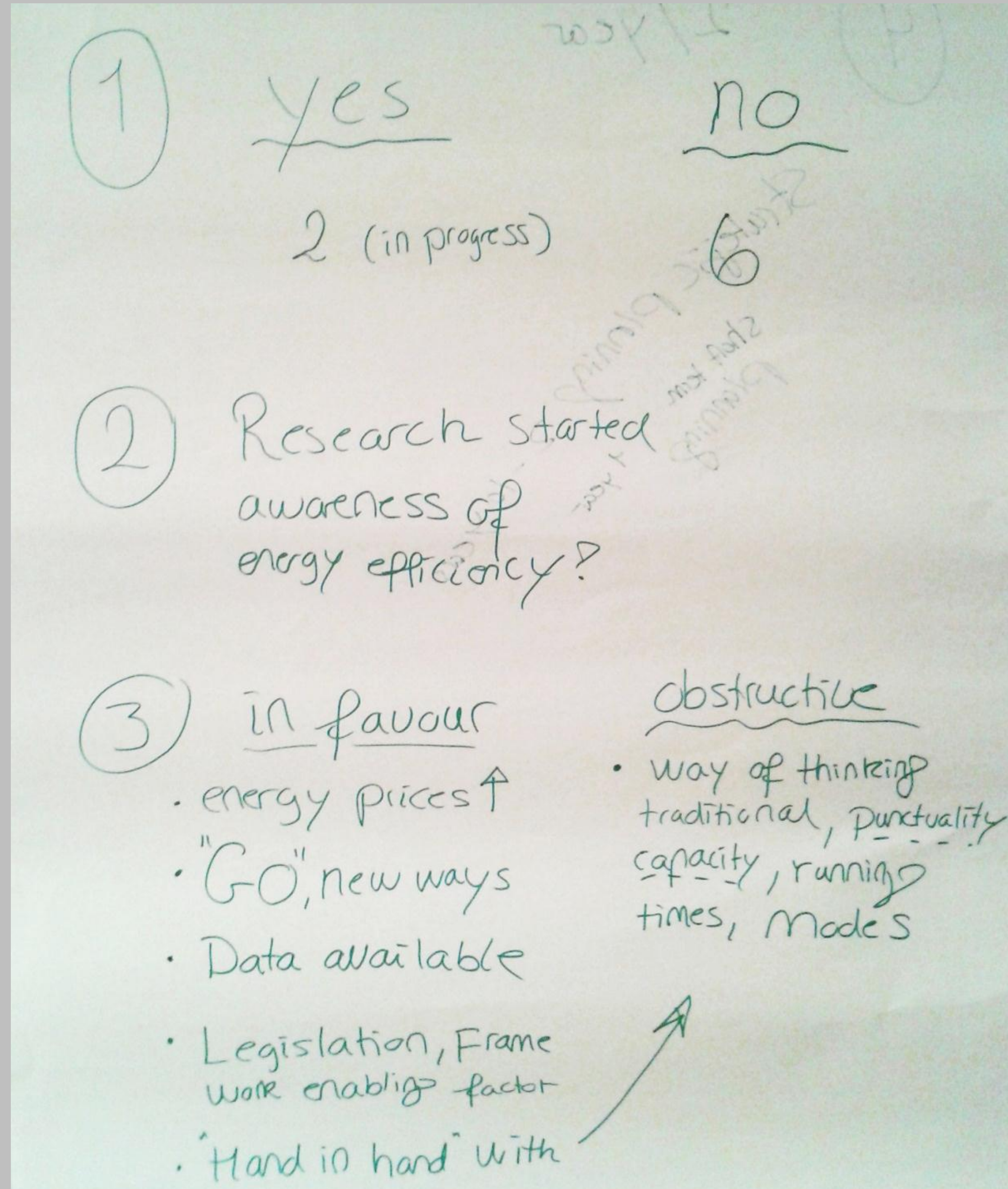
. limited flexibility in design proces (complexity added).

. Show positive impact of Eco driving (DAS) on punct., safety, flow, capacity

(4) - 2 year+ @ NS

- 5 years at NMBS if infra needed

Results of group 2&3



4. **Timetable is done twice a year, strategic planning requires 2-5 years**