

„winter within the limits“

CROSS Zlín, s.r.o.
Road Traffic Technology

Winter Maintenance Index



Winter Maintenance Index (WMI)

Contents:

- Principles
- Calculation
- Features
- Output
- References

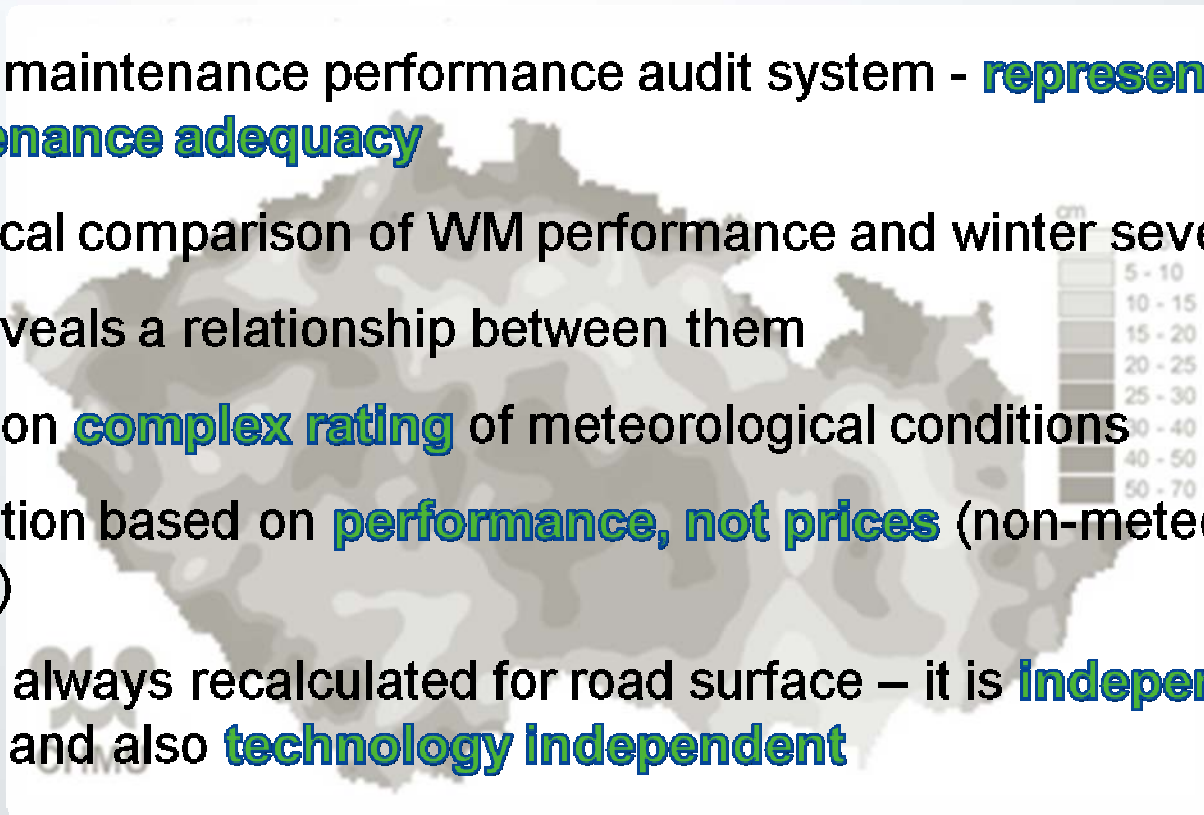


WMI development partners

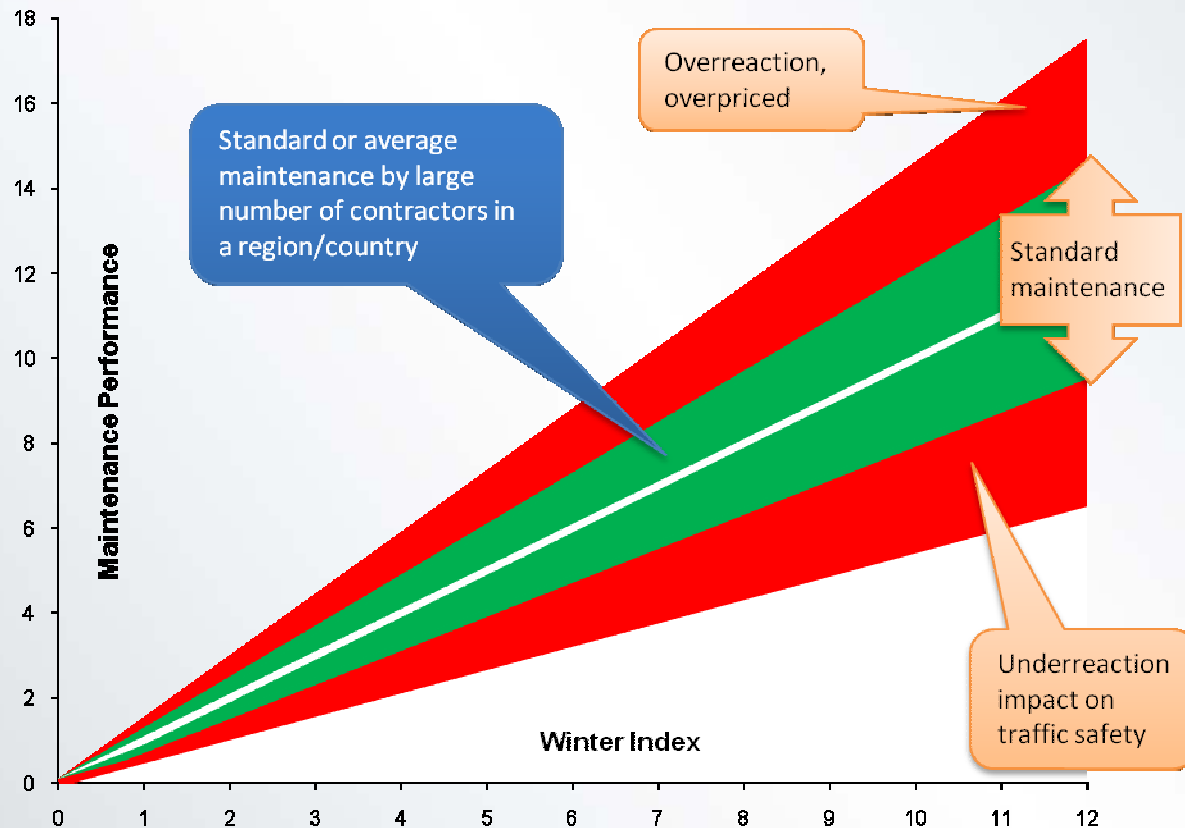
 The logo of Ředitelství silnic a dálnic ČR (Road and Motorway Directorate of the Czech Republic) consists of a white stylized cross-like symbol on a blue background, with the text "ŘEDITELSTVÍ SILNIC A DÁLNIC ČR" to its right.	Road and Motorway Directorate of the Czech Republic
 The logo of the Czech Hydro Meteorological Institute features two red circles above a blue wavy line representing water or clouds.	Czech Hydro Meteorological Institute
 The logo of Správa a údržba silnic Pardubického kraje (Administration and Road Maintenance of the Pardubice Region) shows a stylized orange and grey arrow pointing right, with the text "Správa a údržba silnic Pardubického kraje" below it.	Administration and Road Maintenance of the Pardubice Region
 The logo of ŘSZK (Directorate of the Roads of Zlin Region) is a blue square with a yellow border containing the text "ŘSZK" in yellow.	Directorate of the Roads of Zlin Region

Principles

- Winter maintenance performance audit system - **represents maintenance adequacy**
- Statistical comparison of WM performance and winter severity
 - Reveals a relationship between them
- Based on **complex rating** of meteorological conditions
- Evaluation based on **performance, not prices** (non-meteorological factors)
- WMI is always recalculated for road surface – it is **independent on length** and also **technology independent**



Dependence of maintenance level on weather



Calculation process

- **Cumulative index**
- **Altitude** and other factors of landscape are taken into account
- Standardized to cells of 500x500 m » **method accuracy $\pm 10\%$**

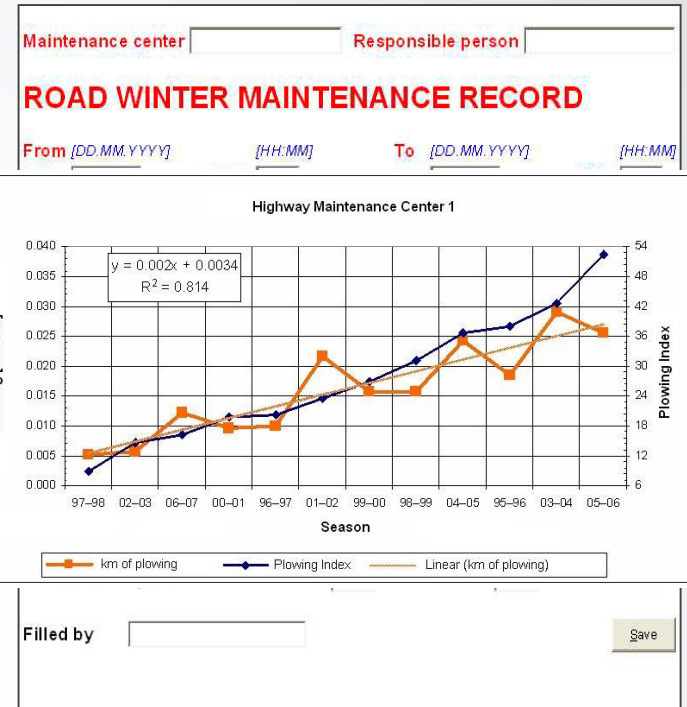
Snow	• new snowfall
Frost	• high humidity and temperatures around zero
Ice	• freezing rain
Slippery Surface	• weak snowfall and temperatures around zero
Snow Drift	• powdery snow and strong wind speed

Calculation process weekly

Performance data report (web form)

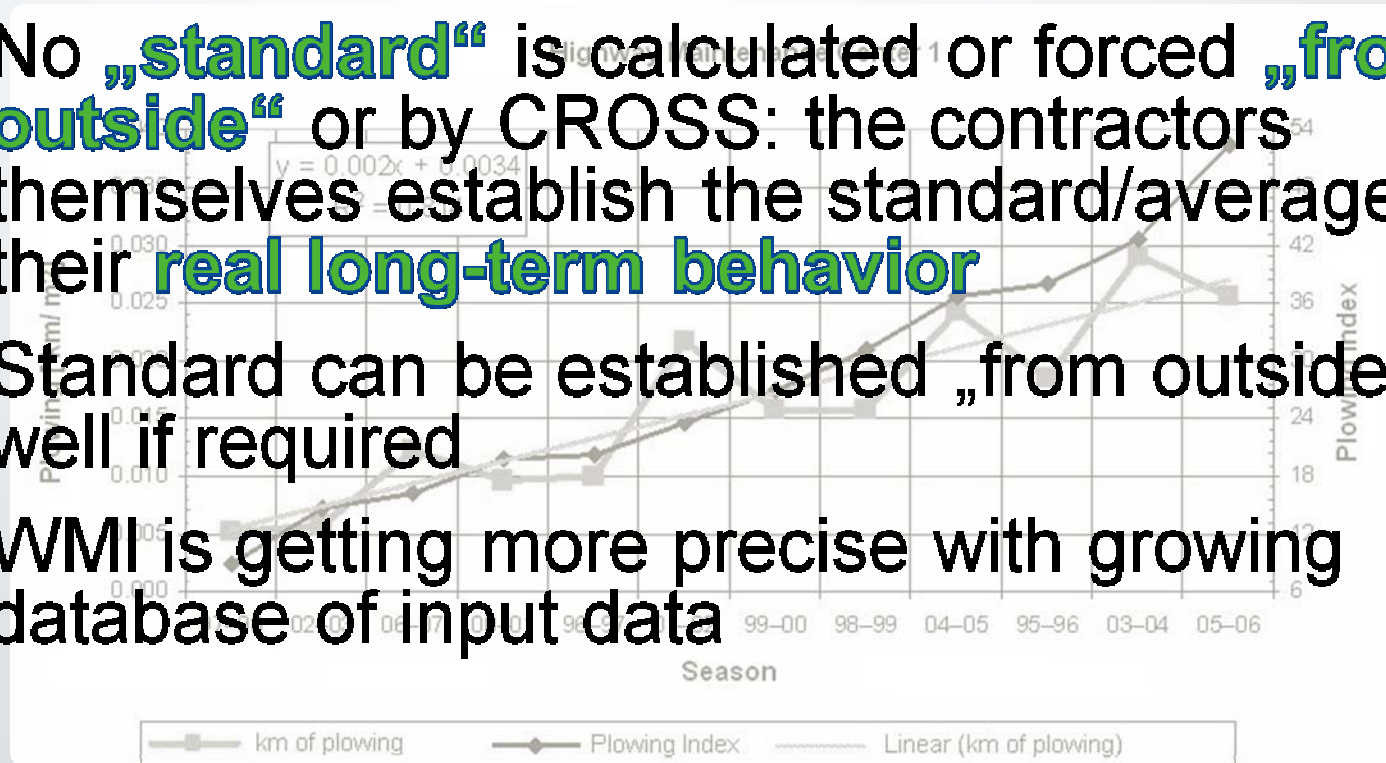
Meteorological rating + factor rating » index

Statistical part » graphic output

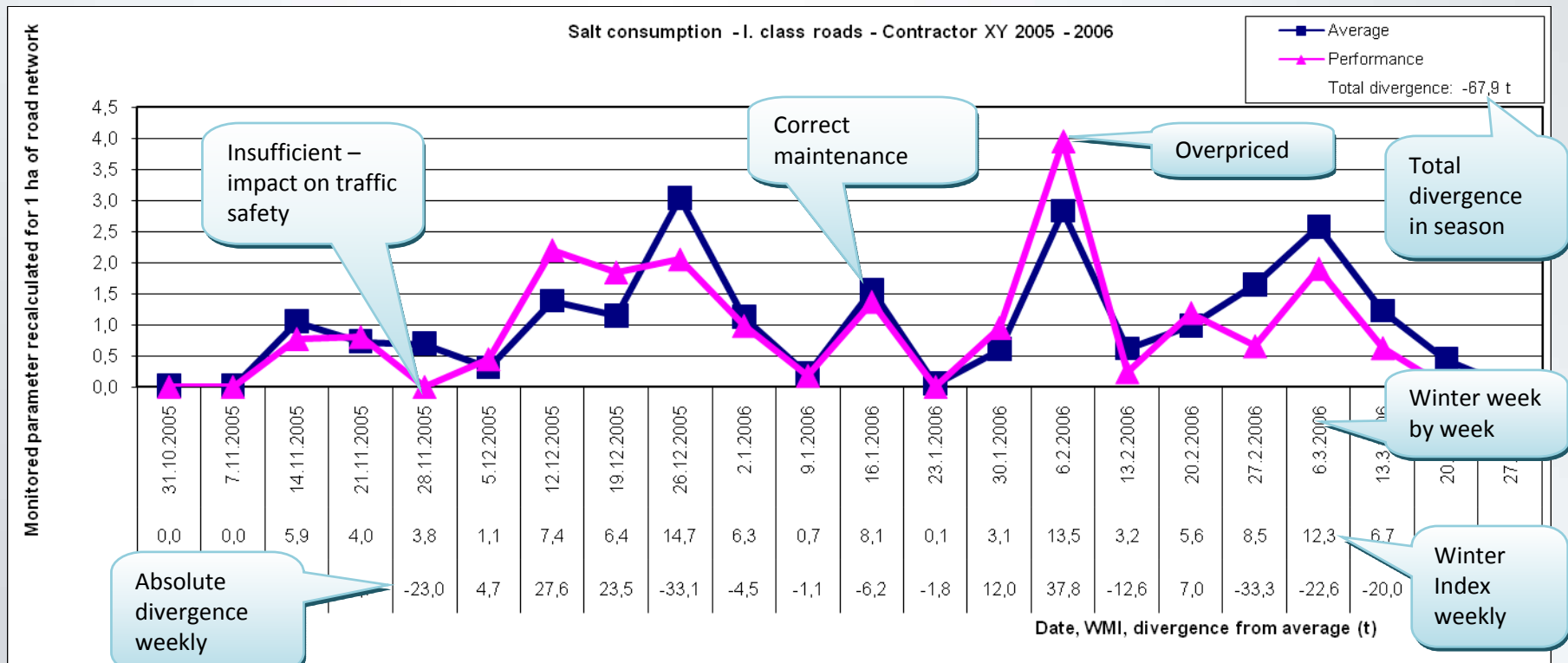


Performance – Index relation

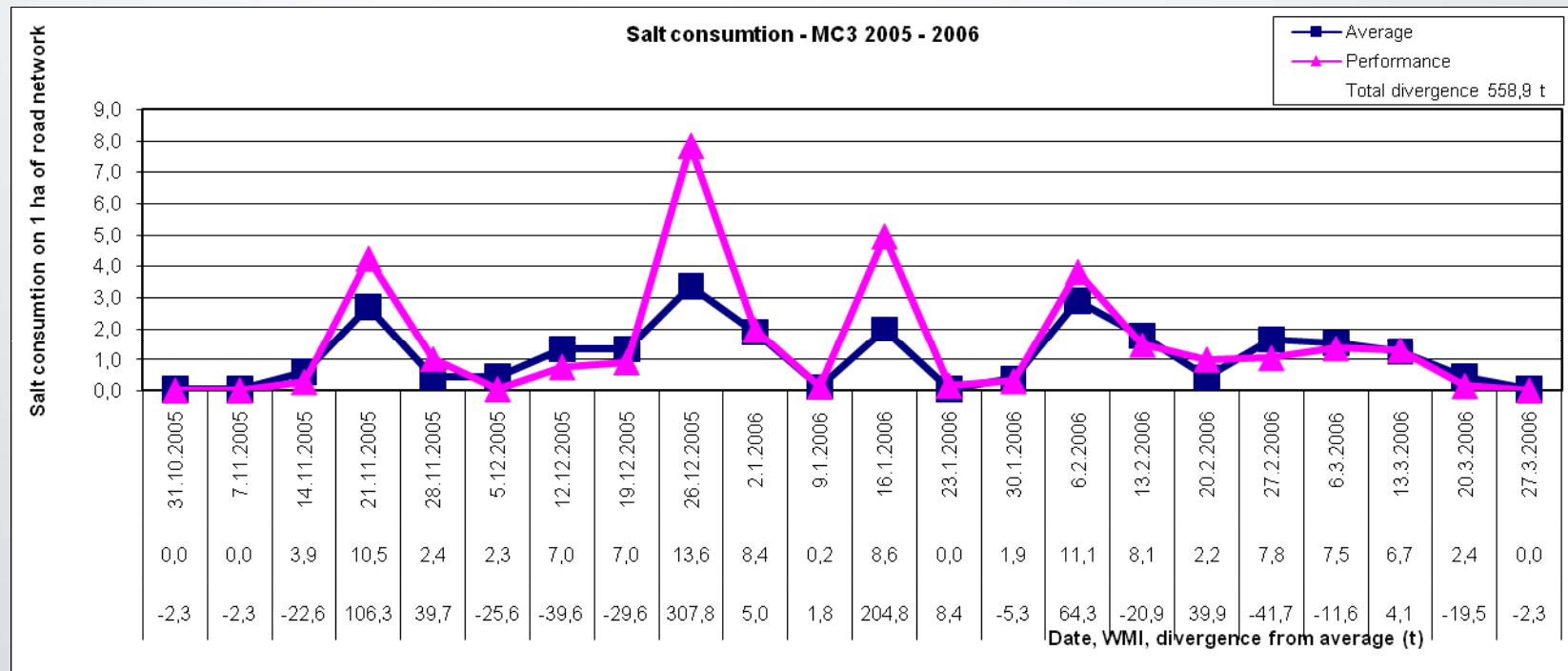
- No „**standard**“ is calculated or forced „**from outside**“ or by CROSS: the contractors themselves establish the standard/average by their **real long-term behavior**
- Standard can be established „from outside“ as well if required
- WMI is getting more precise with growing database of input data



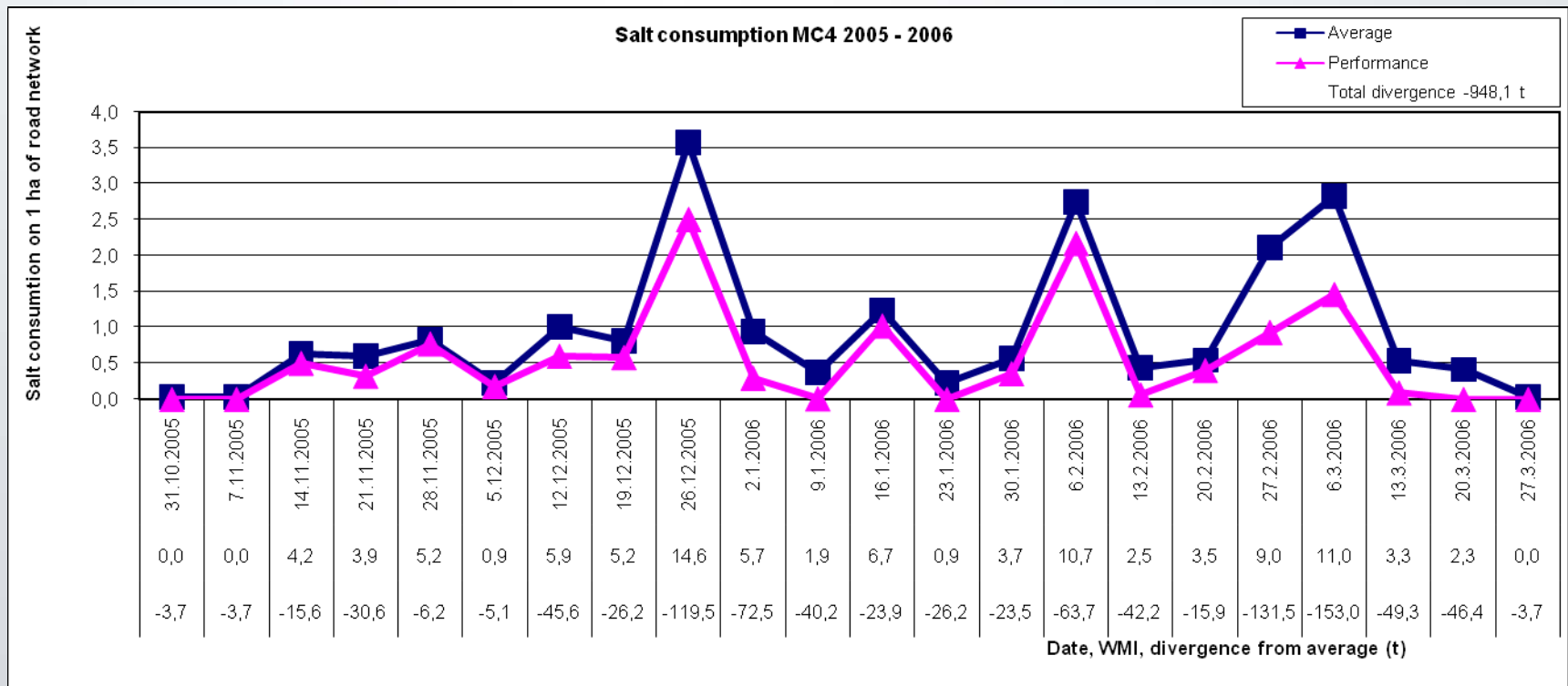
Output example (weekly analysis)



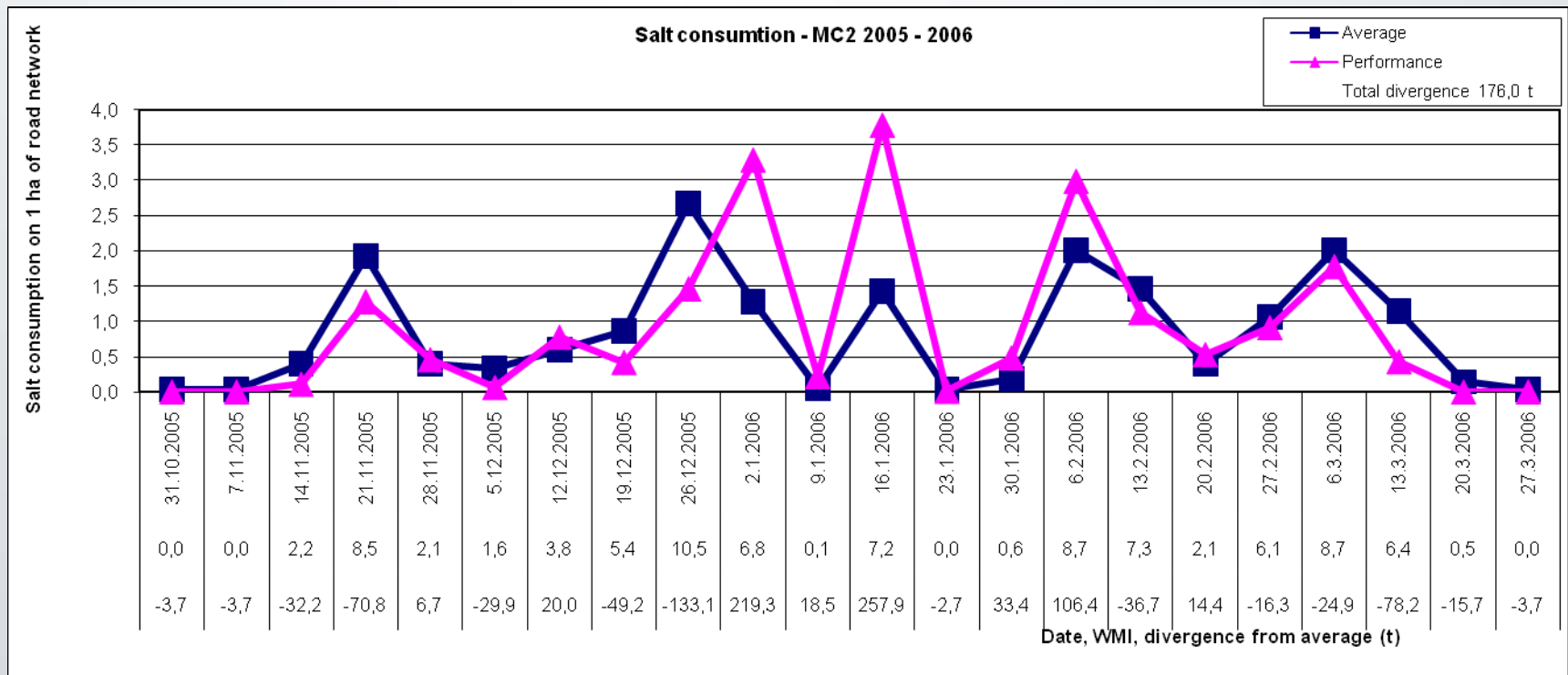
Output example (typical overreaction)



Output example (typical underreaction)



Output example („end of year effect“)



Output example

Maintenance Contractor XY		INVOICE	
[Street]			
[City]			
Phone [(509) 555-0190]	Fax [(509) 555-0191]	INVOICE #[100]	DATE: MARCH 20, 2008
TO:	FOR:		
Road Administration	Road Winter Maintenance		
[Street]			
[City]			
DESCRIPTION			AMOUNT
Winter maintenance	Feb 2008		253,00
	TOTAL		2 256 253,00

Make all checks payable to Maintenance Contractor XY
Total due in 15 days. Overdue accounts subject to a service charge of 1% per month.

Thank you for your business!

Key benefits

- **Weekly and seasonal analysis** of WM performance
- Evaluation of **long-time** meteorological **conditions**
- Establishing „**standard performance**”
- Detection of isolated **anomalies** and **long-time divergences**
- Achieving **adequate quality** of WM and increasing traffic safety while keeping costs down – **savings up to 10 %!**
- Internet based **remote service**

References...

- WMI on regular basis **since 2003/2004**
- Historical data evaluation since 1961/62 winter season
- **990 km** of highways, **5.900 km** of I. class roads, **49.000 km** of II. and III. class roads
- **32** independent contractors/maintenance organizations
- **189** regions in the Czech Republic



„winter within the limits”

CROSS Zlín, s.r.o.
Road Traffic Technology



WINTER MAINTENANCE INDEX (WMI)



Thank you for your attention!

Tomas POSPISEK

pospisek@cross.cz