

Potential of winter maintenance for traffic safety in Finland

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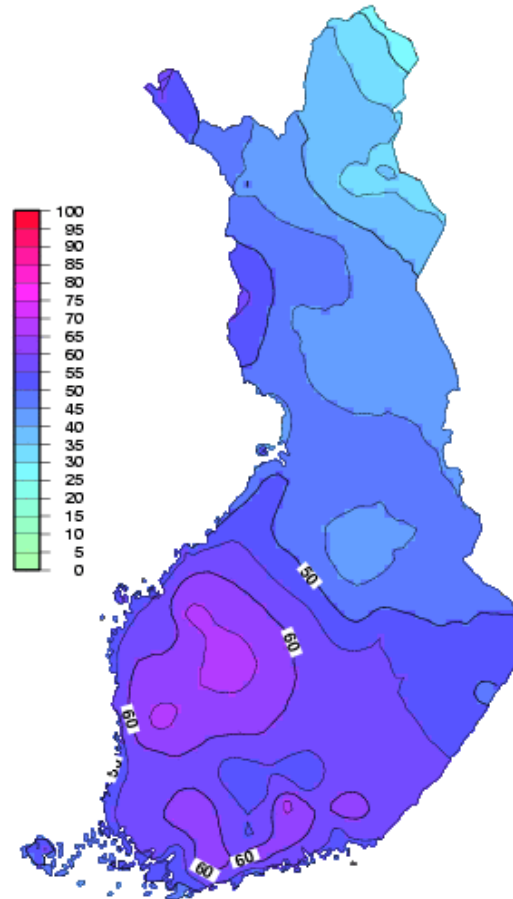
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0. CONTENT

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2. Wintertime traffic safety in Finland since 1980
3. Accident reduction potential
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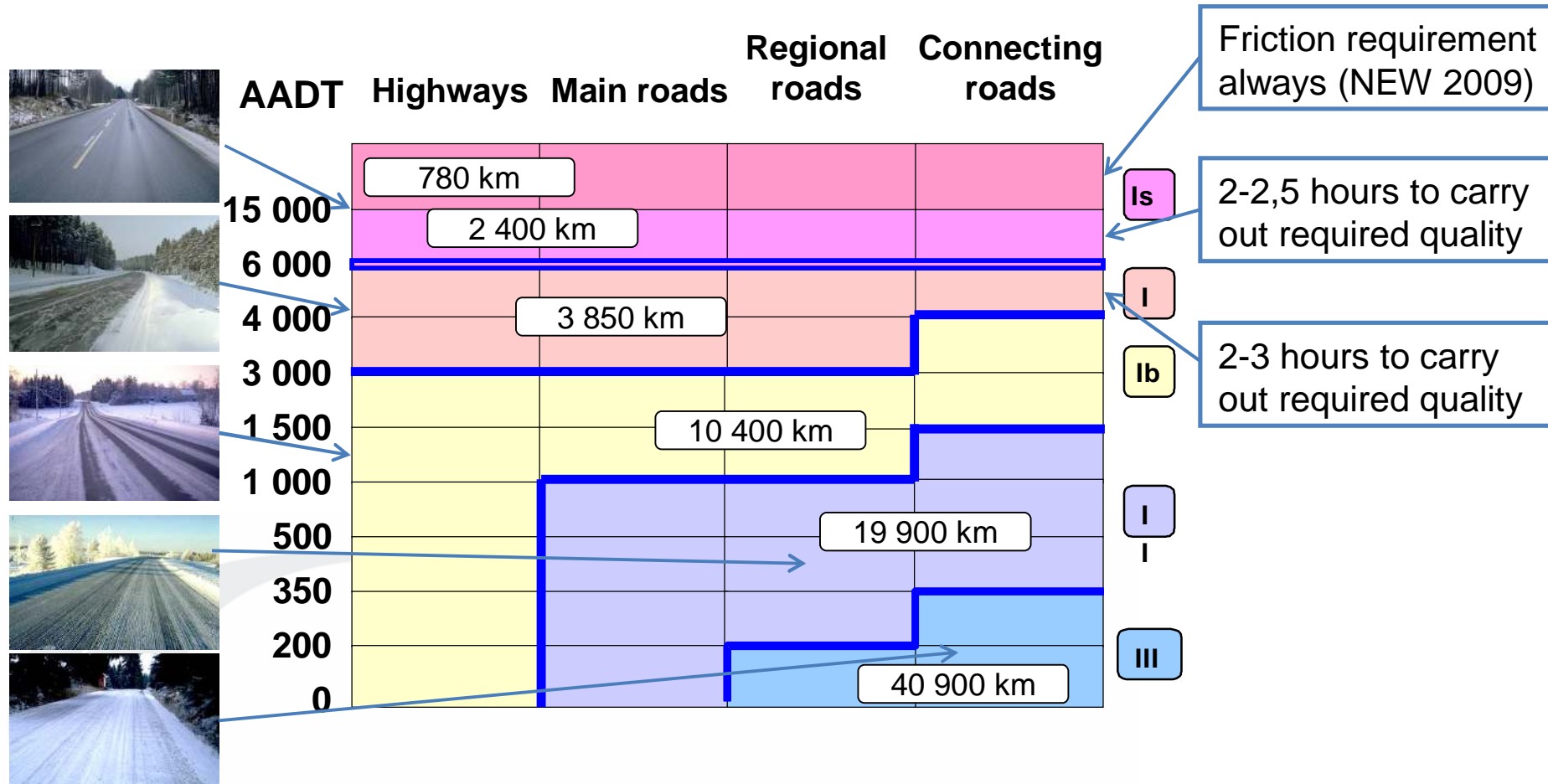
1. INTRODUCTION

- Traffic safety analysis in many ways in winter in Finland (Long-term accident data, science based analyse tool, speeds, strong risk-factors)
- Winter maintenance policy
- Traffic safety trends
- Traffic safety milestones
- Accident reduction potential

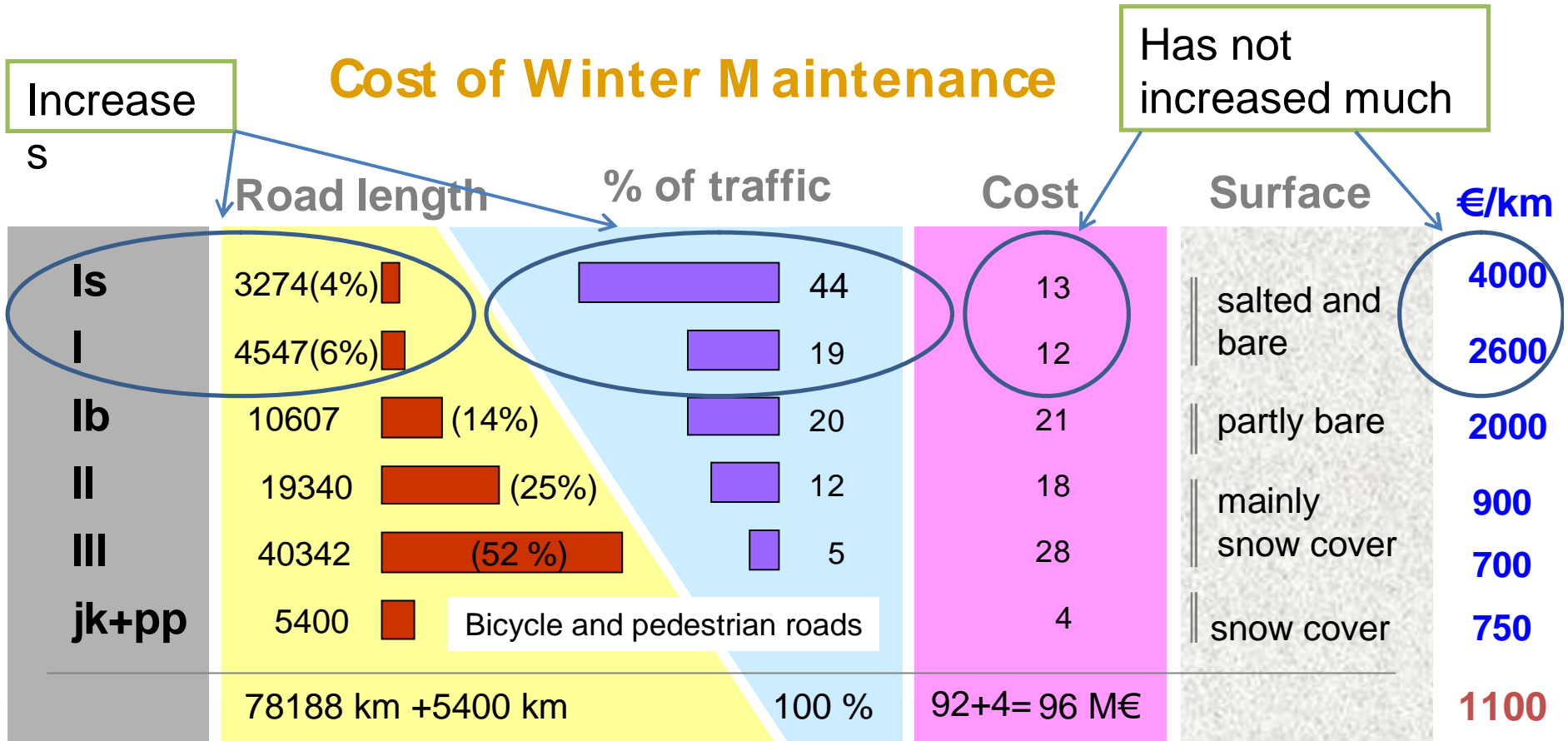


Temperature below zero
winters 1971 - 2000

Winter Maintenance Classification in Finland

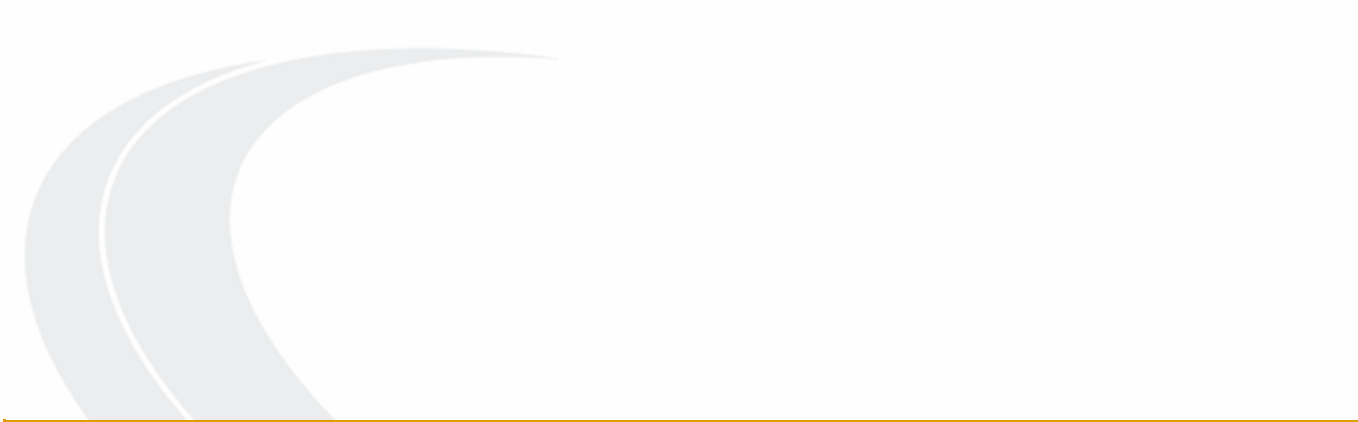


Cost of Winter Maintenance

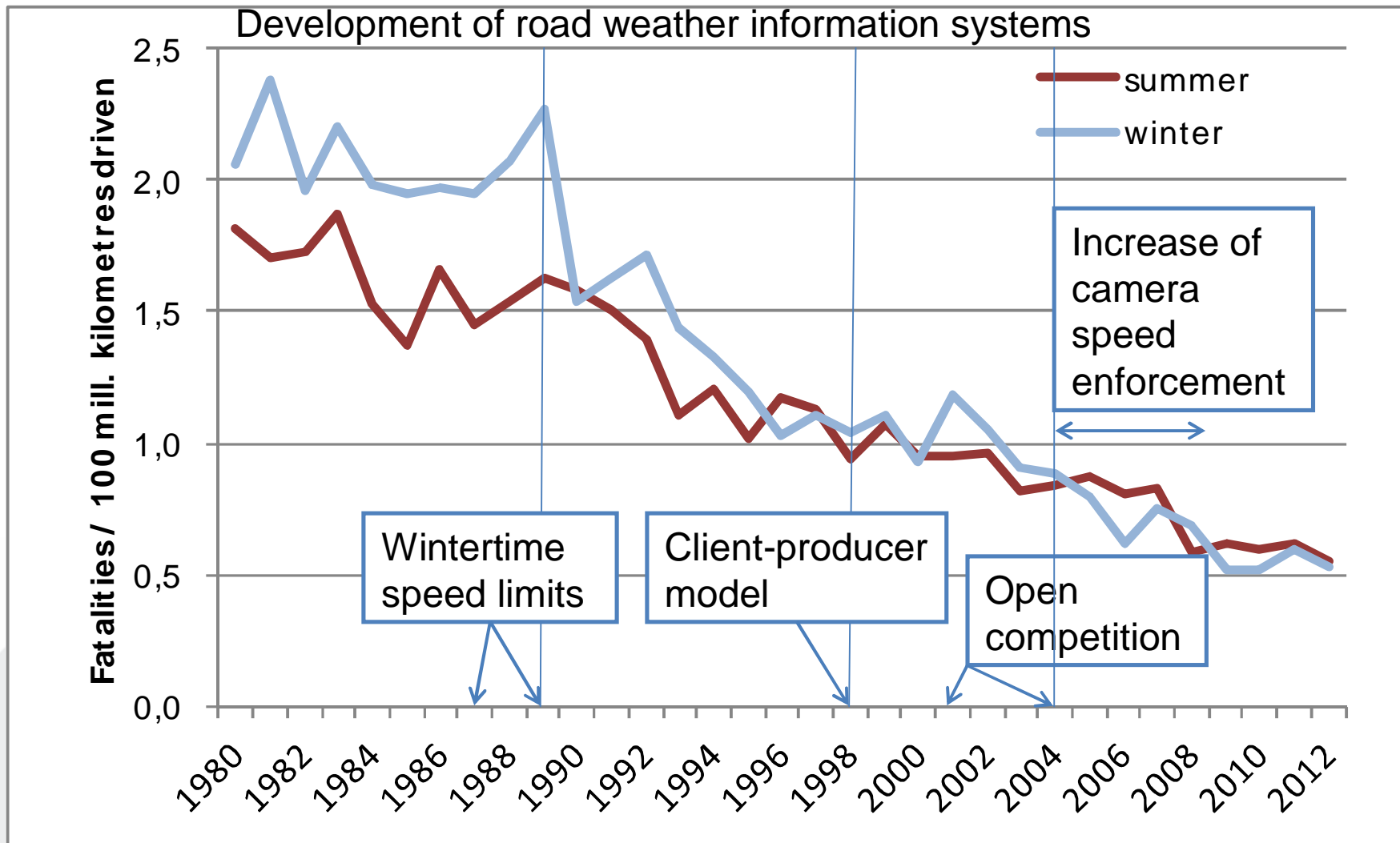


2013 Decision: No more increase in winter maintenance classes due to lack of financing

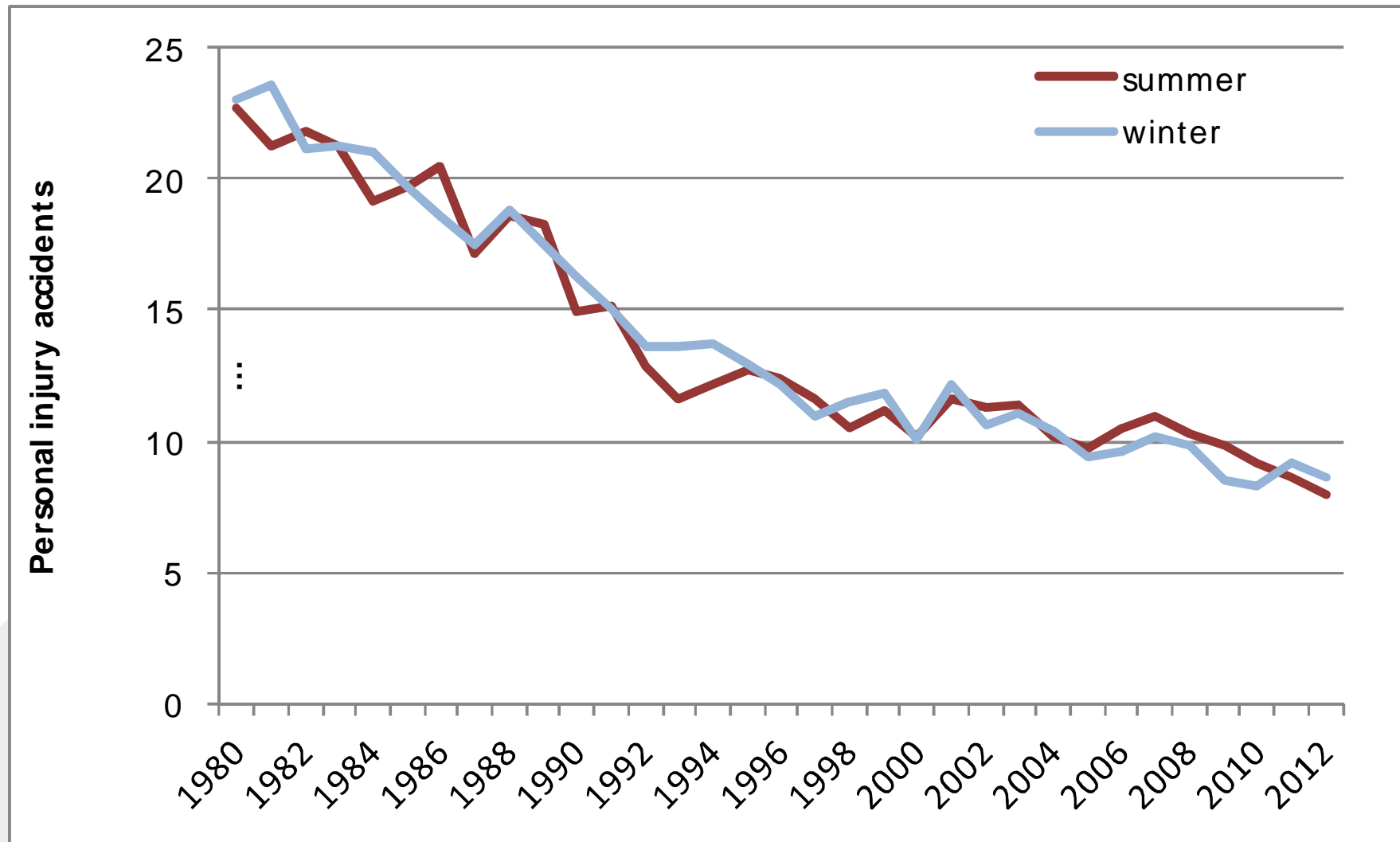
2. WINTERTIME TRAFFIC SAFETY IN FINLAND SINCE 1980



Traffic safety on state roads of Finland since 1980



Severity of accidents has reduced



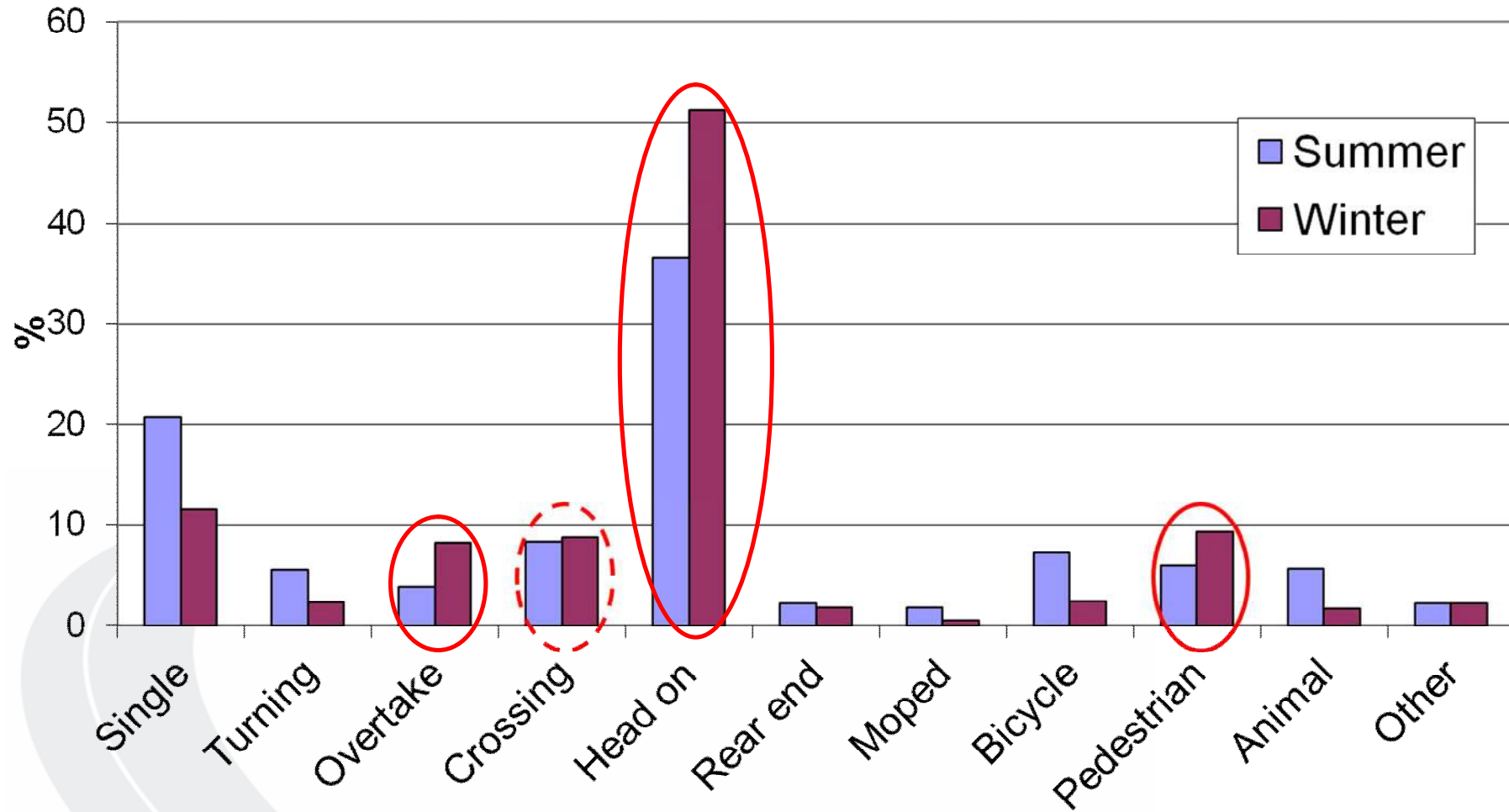
Factors behind the positive safety trend in winter

- Wintertime speed limits (9000 km) on main roads, 12 lives/year
- Automated speed enforcement (3000 km), 12 lives/winter
- Road weather information systems
- Winter maintenance
- Vehicle technology
- Winters: less mileage on wintry road conditions
- New motorways/roads

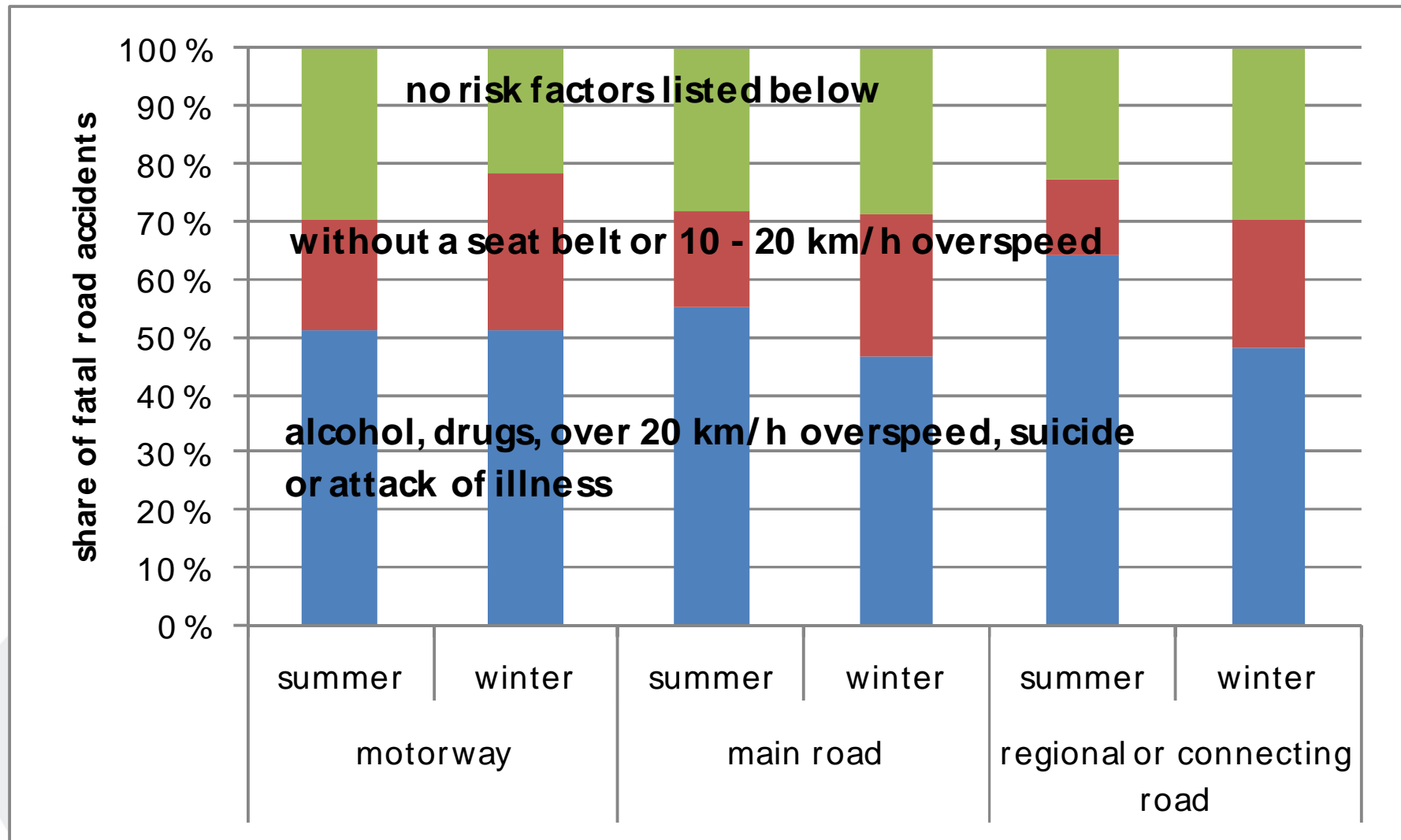
3. ACCIDENT REDUCTION POTENTIAL



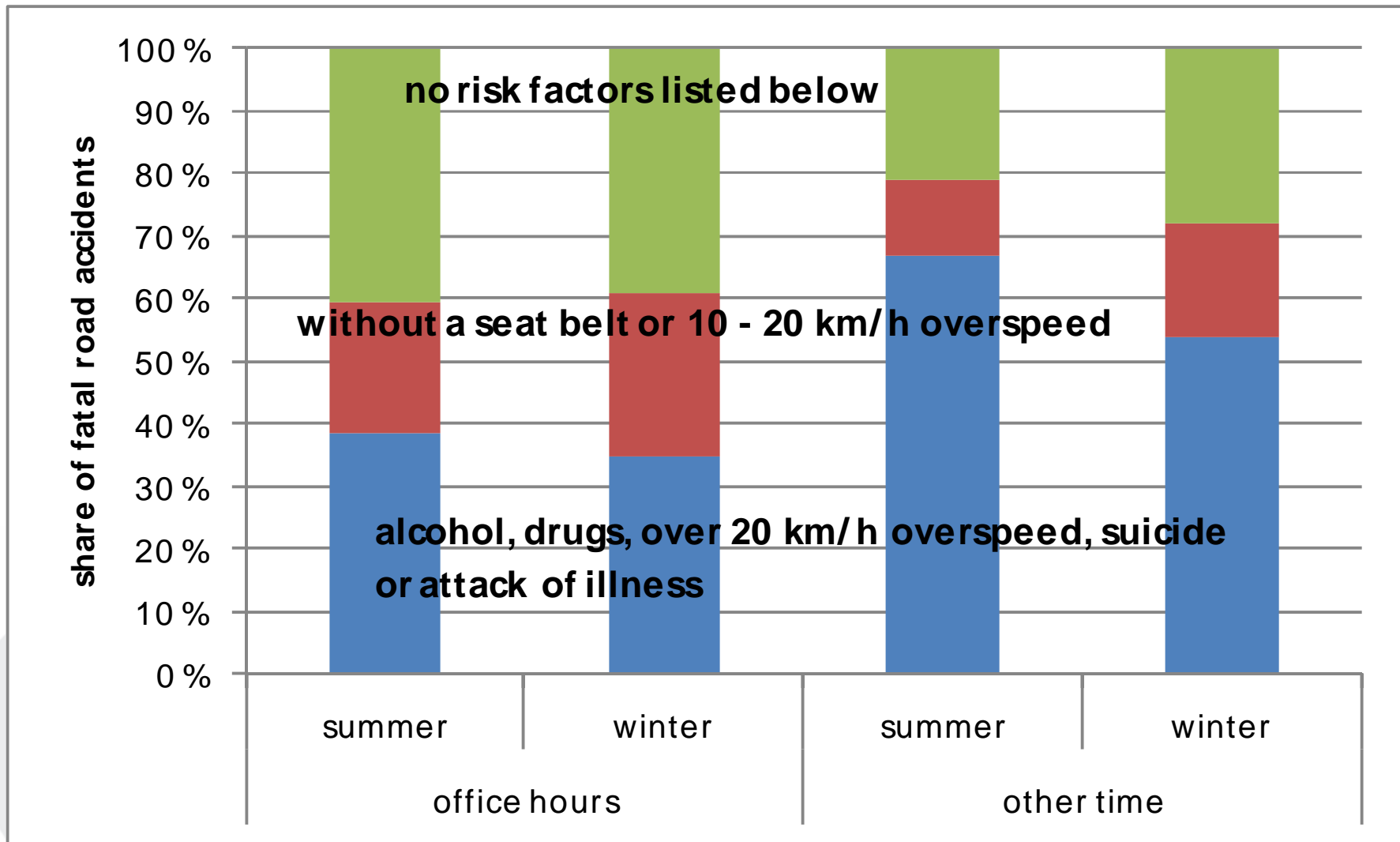
Fatalities (N=1016) on main roads 1997 - 2008



Fatal accidents on state roads 2008 - 12



Fatal accidents on state roads 2008 - 12



Safety on Finnish state roads in 2008 - 12

Road group	Road length (km)	AADT (veh/day)	Fatalities				Injury accidents			
			N/year	Risk ¹	Density ²	Winter-risk ³	N/year	Risk ¹	Density ²	Winter-risk ³
High-class roads										
Motorway	780	23583	10.2	0.15	1.31	-14%	212	3.2	27	8%
Other 2 carriageways	484	18455	4.8	0.15	0.99	8%	222	6.8	46	9%
Semi-motorway ⁴	101	10497	4.4	1.14	4.38	8%	16	4.1	16	15%
Rural main roads										
wide ⁵	2185	5402	32.2	0.75	1.47	10%	254	5.9	12	1%
narrow	8276	2170	47.2	0.72	0.57	7%	454	6.9	5	2%
Rural minor roads										
wide ⁵	1146	2966	7.6	0.61	0.66	-17%	110	8.9	10	1%
narrow	56689	321	52.2	0.79	0.09	-15%	856	12.9	2	-10%
Urban roads										
Urban sign	2423	2527	12.8	0.57	0.53	-9%	413	18.5	17	-4%
Main road, dense ⁶	1397	5260	18.2	0.68	1.30	1%	249	9.3	18	1%
Minor road, dense ⁶	4632	1533	18	0.69	0.39	-17%	357	13.8	8	-5%
Total	78113	1284	207.6	0.57	0.27	-3%	3142	8.6	4	-2%

Accident reduction potential of winter maintenance/year

Road group	Road length (km)	Fatalities				Injury accidents			
		N/year	N/winter ¹	%/winter ²	Reduction potential ³	N/year	N/winter ¹	%/winter ²	Reduction potential ³
High-class roads									
Motorway	780	10.2	3.9	38	0.17	212	103	49	4.5
Other 2 carriageways	484	4.8	2.3	48	0.10	222	109	49	4.8
Semi-motorway ⁴	101	4.4	2.1	47	0.09	16	8	52	0.4
Rural main roads									
wide ⁵	2185	32.2	15.9	50	0.70	254	115	45	5.1
narrow	8276	47.2	22.8	48	1.00	454	208	46	9.2
Rural minor roads									
wide ⁵	1146	7.6	2.9	38	0.06	110	50	46	1.1
narrow	56689	52.2	20.3	39	0.45	856	346	40	7.6
Urban roads									
Urban sign	2423	12.8	5.2	41	0.23	413	179	43	7.9
Main road, dense ⁶	1397	18.2	8.4	46	0.37	249	113	46	5.0
Minor road, dense ⁶	4632	18	6.9	38	0.15	357	153	43	3.4
Total	78113	207.6	90.9	44	3.33	3142	1389	44	48.9

4. CONCLUSIONS

- It is essential to analyse traffic safety in wintertime by road standard
- Many analysis base only on winter maintenance classes (not enough answers)
- Accident reduction potential of quality management in winter maintenance is 3.3 fatalities and ca 50 injury accidents per year in Finland
- There is more to lose than win by winter maintenance on traffic safety
- By improving winter maintenance of 5 % of roads almost 50 % of traffic will enjoy positive safety effects (cost-effectiveness)