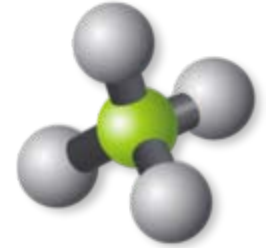


From Waste to Traffic Fuel

# W-Fuel



## Environmental and economic impact assessment on food waste prevention

Case studies in Turku region, Salo region,  
Helsinki region and Kymenlaakso

12.3.2012

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# Waste prevention is the first priority of waste management

- National Waste Plan (2008) set a target of diminishing municipal waste volume.
- EU requires that all life cycle effects should be taken into account in political decision making related to waste management.
- Therefore the impacts of waste prevention should be taken into account when planning the waste management solutions.

# Objective is to assess the impacts related to municipal bio-waste prevention

- Analysis is limited to the municipal food waste
  - Edible food waste: originally edible food that is totally avoidable, because generated in vain.
  - Inedible food waste: parts of the food that are not originally edible; peels, parings, bones and coffee grounds. Partially avoidable.
- Sectors/ waste generators in consideration
  - Households
  - Public sector (e.g. schools and hospitals)
  - Retail
  - Other private sector (mainly hotels and restaurants)

# Initial data

- Leans mainly on the existing studies and information provided previously in the W-Fuel project
- Data has been supplemented with expert opinions and assumptions

# The effects of wasted food

1. Sector specific composition assessments on edible and inedible parts at the product group level
2. Environmental life cycle impacts (average emissions of edible and inedible food waste, kgCO<sub>2</sub>-eq/ kg)
  - Early phase from primary production to retail
  - Usage phase (e.g. storing and cooking)
  - Waste management (decreased emissions possible)
3. Economic impacts from waste generator's point of view (average costs of edible and inedible food waste, €/ kg)
  - Purchase costs
  - Usage phase costs
  - Waste fees

# The effects of prevention were defined by comparing two different cases in 2020

- Base case:
  - Prevention of food waste is not promoted more than currently.
  - Generation of food waste continues to grow and the composition does not change.
  - Waste management is implemented as planned nowadays.
- Prevention case:
  - Food waste prevention is enhanced.
  - Food waste generation decreases by 30 %, focusing mainly on the edible part.
  - Waste management is based on biogas production and traffic use (vs. methane case).

Total food waste volume, t

— Base case

Variation between sectors and areas:  
-2 % - +24 %

+ 9,8 %

2009

2020

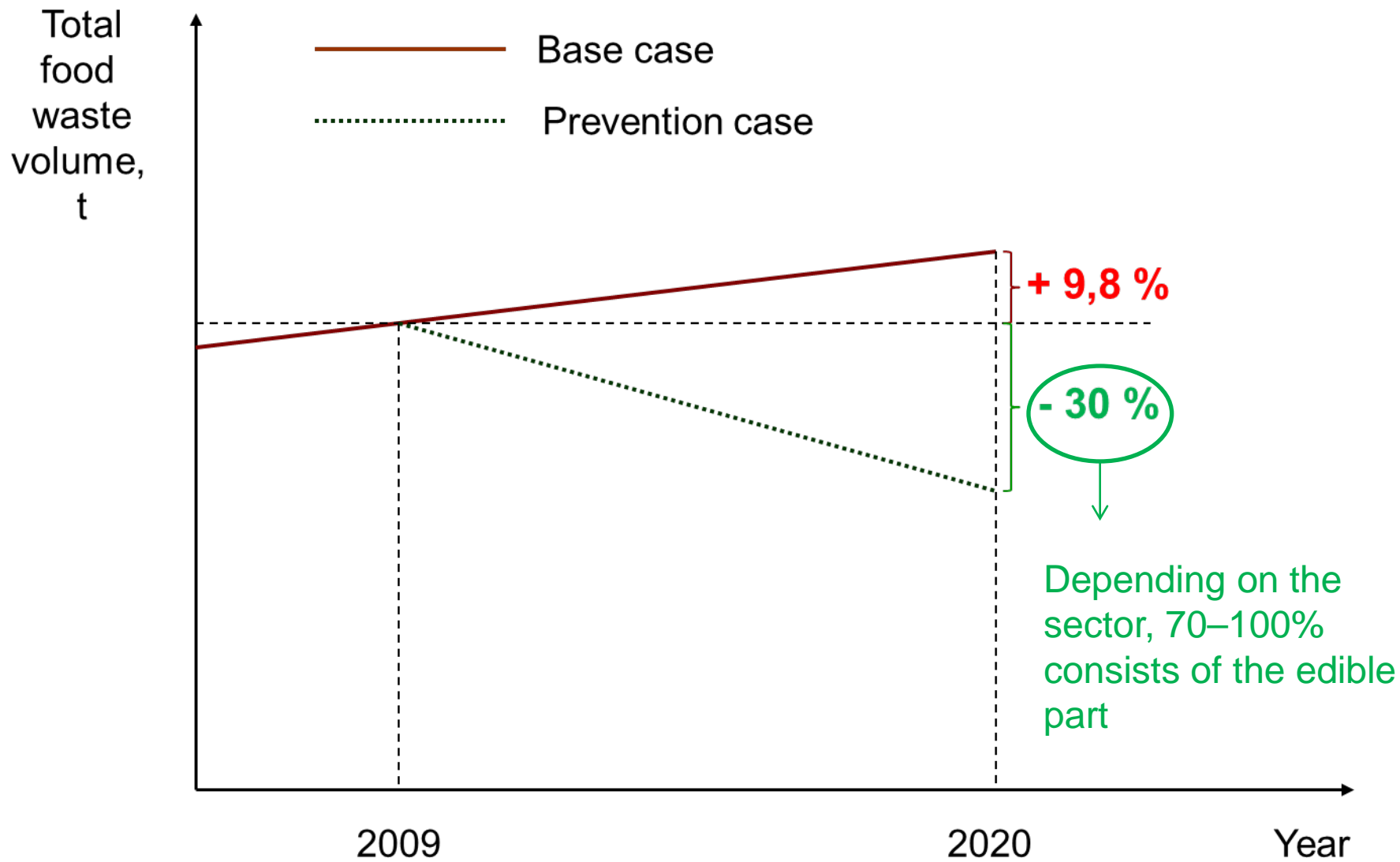
Year



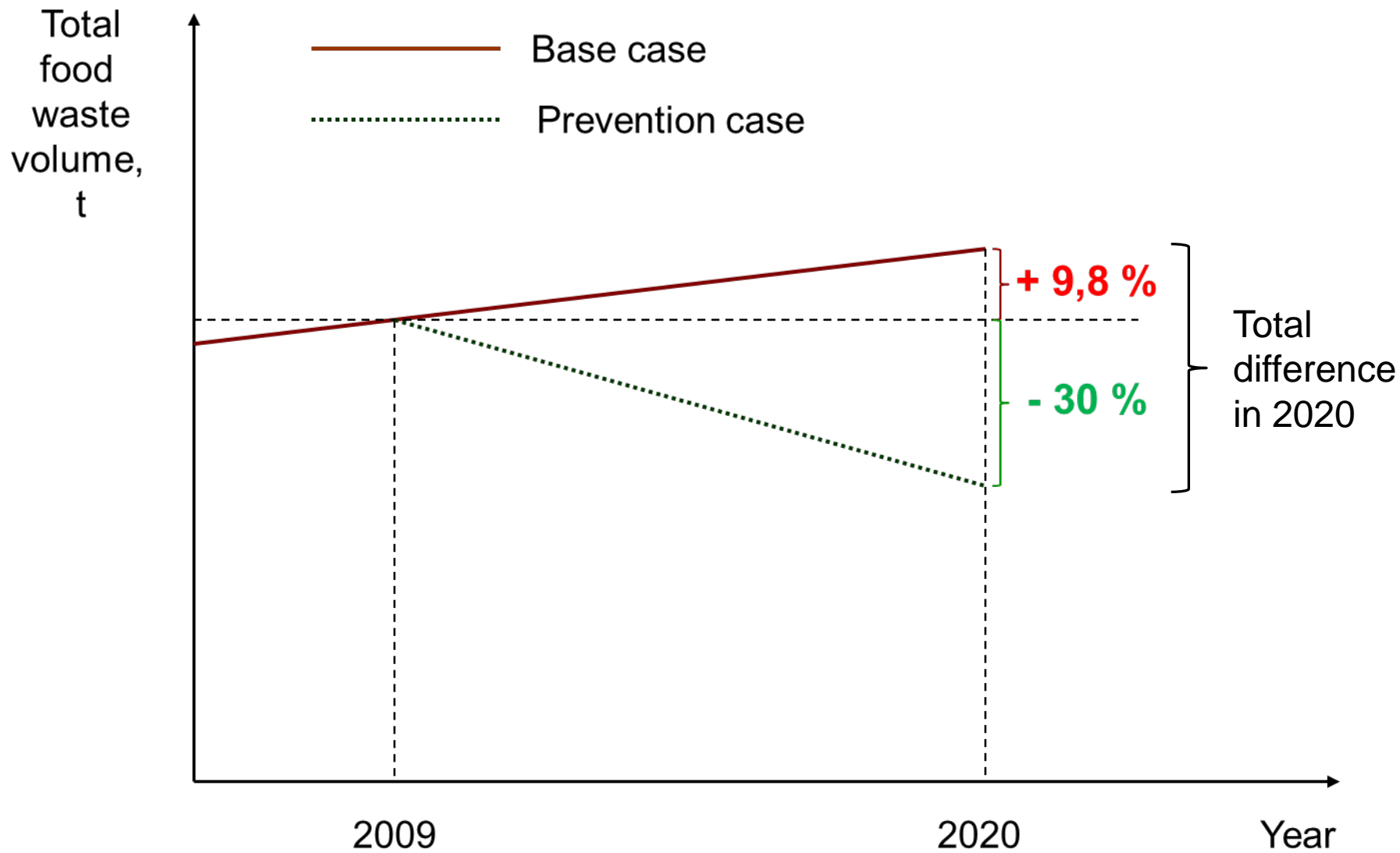
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# Food waste volumes in all sectors and case areas

Food waste volume in 2020	Base case	Prev. case	Difference
Total, tonnes	243 000	152 000	<b>90 000</b>
Total, kg/ capita	136	85	<b>51</b>
In households, kg/ capita	69	44	<b>25</b>
In public sector, kg/ capita	16	10	<b>6</b>
In retail, kg/ capita	34	21	<b>13</b>
In private sector, kg/capita	17	10	<b>7</b>

# Food waste volumes in all sectors and case areas

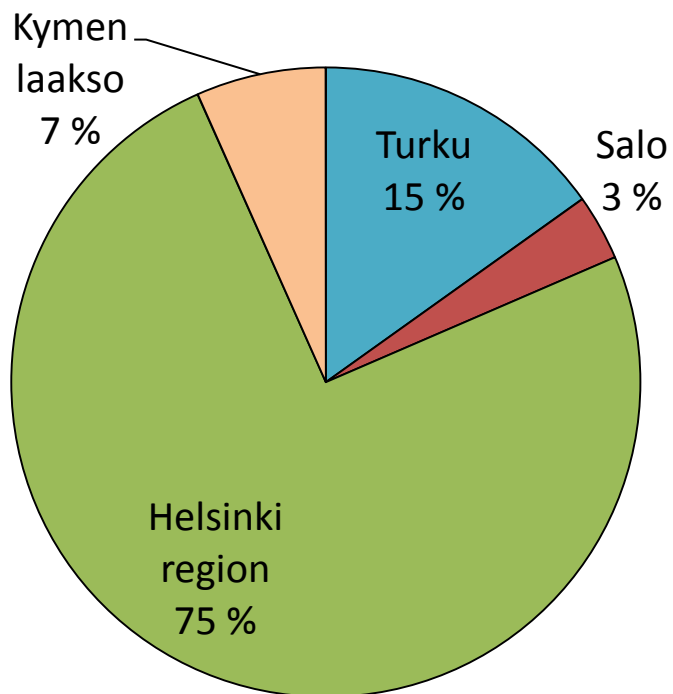
Food waste volume in 2020	Base case	Prev. case	Difference
Total, tonnes	90 000	0	<b>90 000</b>
Total, kg/ capita	85	0	<b>51</b>
In households, kg/ capita	69 → > 10 %	44	25 → 4 %
In public sector, kg/ capita	16	10	<b>6</b>
In retail, kg/ capita	34	21	<b>13</b>
In private sector, kg/capita	17	10	<b>7</b>

In households the annual food consumption is ca 600 kg per capita

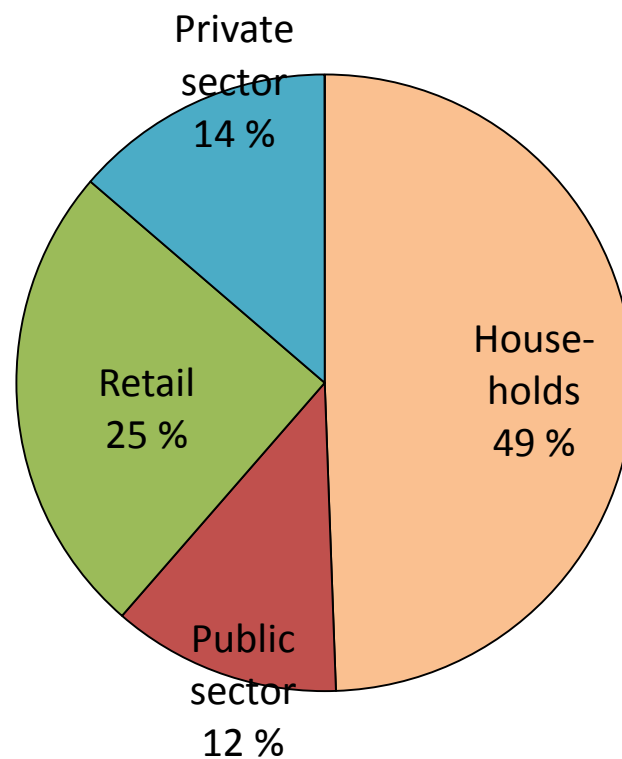


# 90 000 tonnes or 51 kg per capita less food waste in 2020

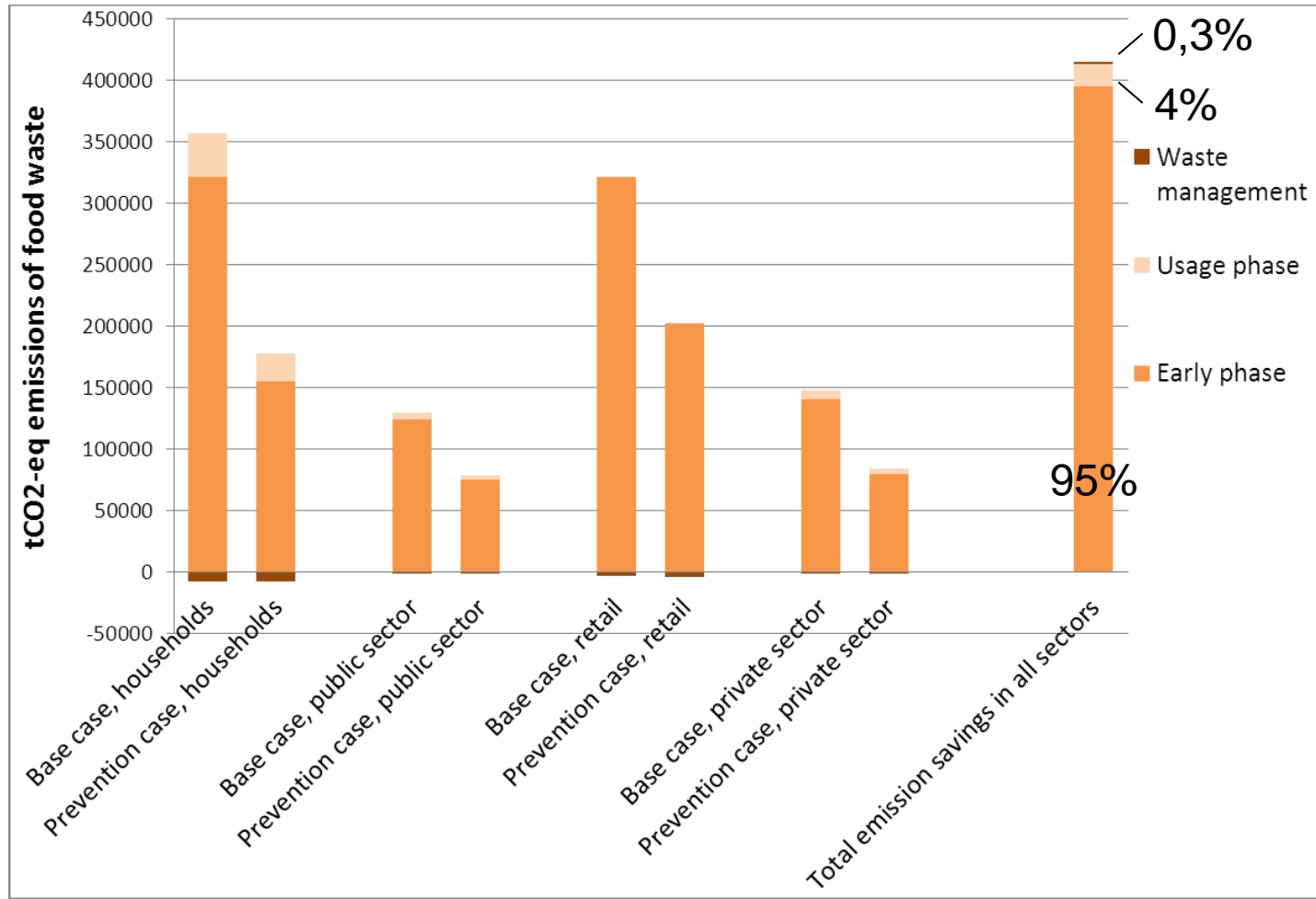
## The division between the case areas



## The division between the sectors



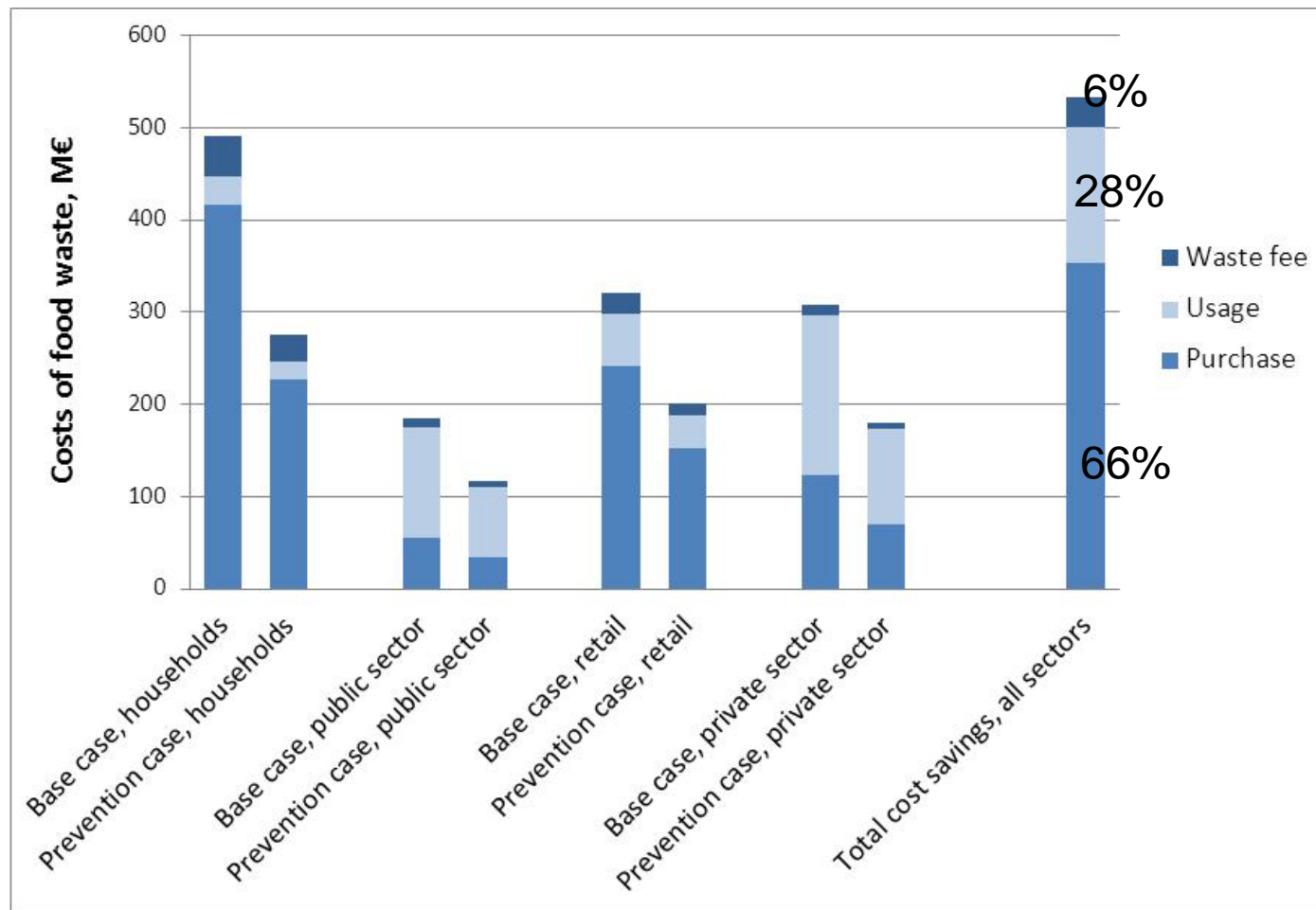
# In Prevention case the CO<sub>2</sub>-eq-emissions are 415 000 t lower than in Base case in 2020 (all case areas and sectors)



The amount corresponds the annual emissions of ca 100 000 petrol cars (production and use)

One prevented food waste kg saves on average 4,6 CO<sub>2</sub>-eq kg

# Waste generators in all sectors and case areas save over 500 M€ due to food waste prevention in 2020



Per kg of food waste this equals **5,9 €** on average (2010 real value).

In households this means on average ca **120 € savings per capita**, which is 5% of the estimated total food consumption in 2020.

# Critical factors

- The food waste composition assessments are only indicative
  - Update of the analysis would specify the results after the knowledge is progressed
- The derived average prices as well as the derived emission coefficients of food product groups have a major influence on the results
  - The results should be considered as indicative
- Prevention target's division between the edible and inedible parts affects the results.

# Conclusions and future research needs

- Food waste prevention decreases global warming and saves money from the waste generators
  - Majority of the emission savings are caused by avoided emissions of food production, processing and distribution (early phase), while the roles of usage and waste management phases are small.
  - This indicates that the waste prevention is deservedly the first priority of waste management in case of municipal food waste.
- To find out the total effects of bio-waste prevention we should extend the analysis
  - other environmental effects
  - wider cost analysis from society's point of view
  - other bio-waste fractions: tissue papers and garden waste



# Thank you!

- Report will be published in the end of April 2012
- Further information: [nea.teerioja\(at\)hsy.fi](mailto:nea.teerioja(at)hsy.fi)



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# Main sources

- Bio-waste volumes in different cases, sectors and areas (W-Fuel, mainly based on Petra- and Martti-databases)
- Composition of bio-waste
  - Households (Toukola et al. 2011, HSY 2007)
  - Public sector (Toukola et al. 2011, Jokinen 2005, Pelli 2011)
  - Retail (Toukola et al. 2011, Jokinen 2005)
  - Private sector (Toukola et al. 2011, Jokinen 2005)
- Composition of food waste (eatable and non-eatable) at the product level
  - Households (Silvennoinen et al. 2012, Valorgas 2010, supplemented with assumptions)
  - Public sector (no studied data, based on the assessments of Pelli 2011, Silvan 2011, Karppinen 2011, Sinisalo 2011, supplemented with assumptions)
  - Retail (Huuhtanen 2005 & confidential notification, supplemented with assumptions)
  - Private sector (no studied data, based on the data related to public sector, supplemented with assumptions)
- Emissions
  - Early phase from primary production to retail (Virtanen et al. 2009, OSF 2011a, OSF 2011b, Kurppa 2011)
  - Usage phase (Kauppinen et al. 2010; Jokinen 2012; Saarinen et al. 2011)
  - Waste management (W-Fuel)
- Costs
  - Purchases (OSF 2010, OSF 2011a, W-Fuel, supplemented with future price development assumptions)
  - Usage costs (Laine 2011, Kodin energiaopas 2011, Koskinen 2006, National Passenger survey 2004-2005, Kivistö 2011, Sakki 2009)
  - Waste fees (HSY 2011, supplemented with future price development assumptions)

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