GHG mitigation potential of Municipal Waste management in OECD member states

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Umwelt Bundesamt

Bundesministerium
für Umwelt, Naturschutz,
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Overview

1. Data OECD
2. GHG Balance: Baseline
3. Scenarios 2030
4. Conclusions

Regional Coverage

Region	States
America	USA, Canada, Mexico, Chile
Europe	EU 27*, Norway, Iceland, Switzerland, Turkey, Israel
Asia/ Pacific	Japan, South Korea, Australia, New Zealand

* The following EU Member States are not member of the OECD: Bulgaria, Romania, Malta, Cyprus, Latvia, Lithuania. Croatia is since 2013 Member State of EU28 but not member of OECD.

However for the purpose of this study all EU 27 countries are considered.

Total waste treated*

Region	Total (million tons)	kg per capita
America	332	688
Europe	273	454
Asia/ Pacific	91	447
OECD total	**696**	**540**

Sources and reference years:

America: USA (US EPA 2013), Canada (OECD 2008), Mexico (INECC 2012), Chile (OECD 2009)
Europa: Eurostat (2011) + Israel (OECD 2009)
Asia / Pacific: Australia (OECD 2009), New Zealand (OECD 2010), Japan (OECD 2008), South Korea (OECD 2009)

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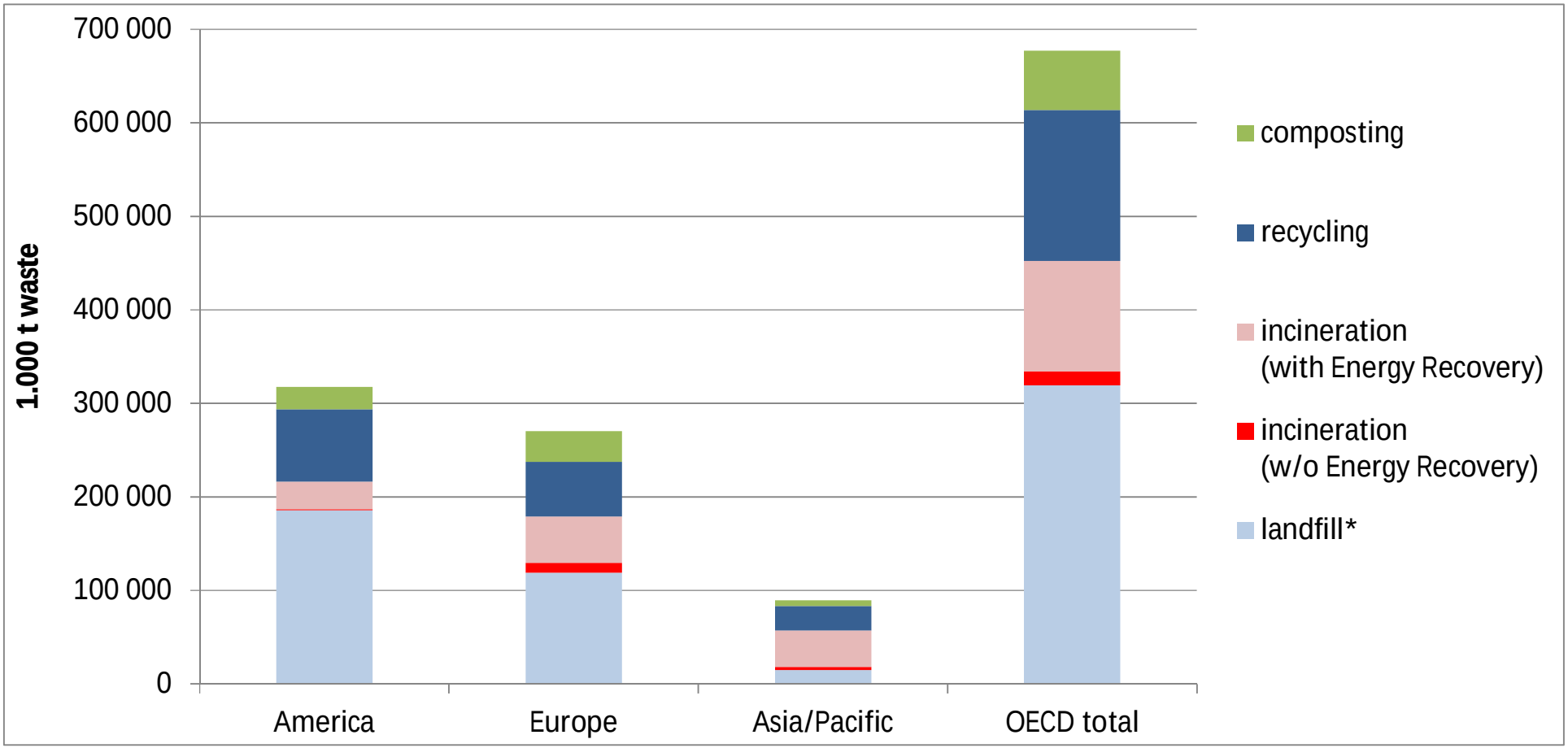
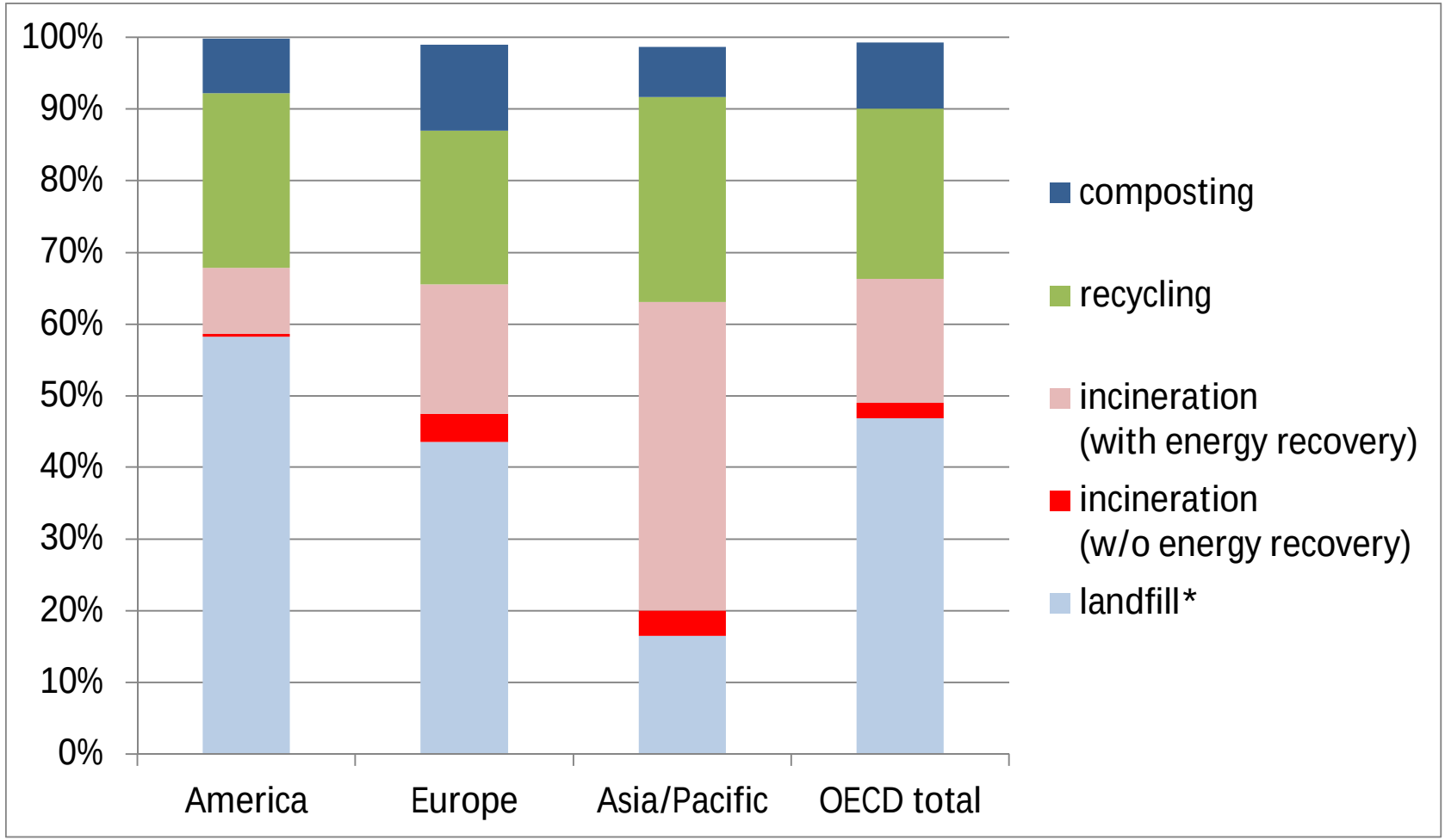
Treatment technologies (total)



* Effective gas collection: America: 49 %, Europe: 20 %, Asia / Pacific: 29 %, OECD: 37 %

Treatment technologies (%)



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Composition of MW and recycling rates for the baseline scenario

- Beyond the scope of this presentation!
- Many national sources and international sources reviewed and completed with own assessments.
- For in-depth experts only!
- The full study will provide sources and assessment accordingly.
- We also know about the “Waste Model” commissioned by EEA / DG.ENV which has much more means for investigations in such issues (but EU 28 only).

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Selected Emission Factors*

Recycling	
Food und Garden waste	-15
Paper/ cardboard	-751
Plastic	-918
Glass	-465
Ferrous metals (steel)	-945
Aluminum	-9 307
Textiles	-2 818

Landfill (examples)	
Without gas collection	1289
20% effective gas collection	1031
60% effective gas collection	412

MBT (incl. recycling, energy recovery and disposal)	
MBT	-138

Incineration with Energy Recovery	
Canada	251
USA	-66
Mexico	75
Chile	92
Israel	11
Switzerland	42
Norway	41
Iceland	41
Turkey	-189
EU27	-148
Australia	-361
New Zealand	-203
Japan	-187
South Korea	-203

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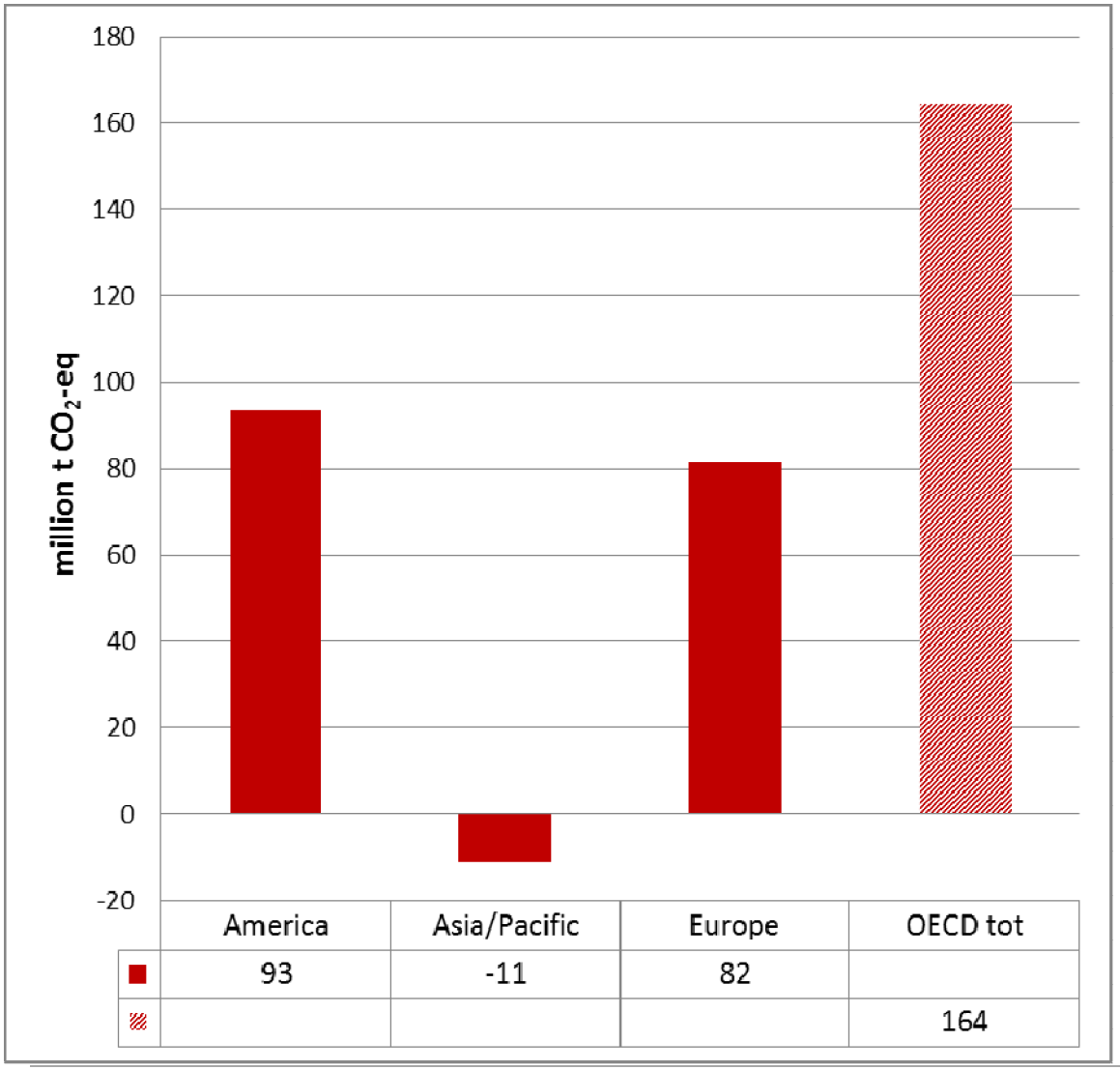
GHG Balance: Baseline



Some reasoning:

- OECD –Asia/Pacific has only small share of landfill and similar share of recycling, and the credits for incineration (w ER) are high.
- The level for OECD-America considers the high gas capture rate and the (lower) credits for incineration.

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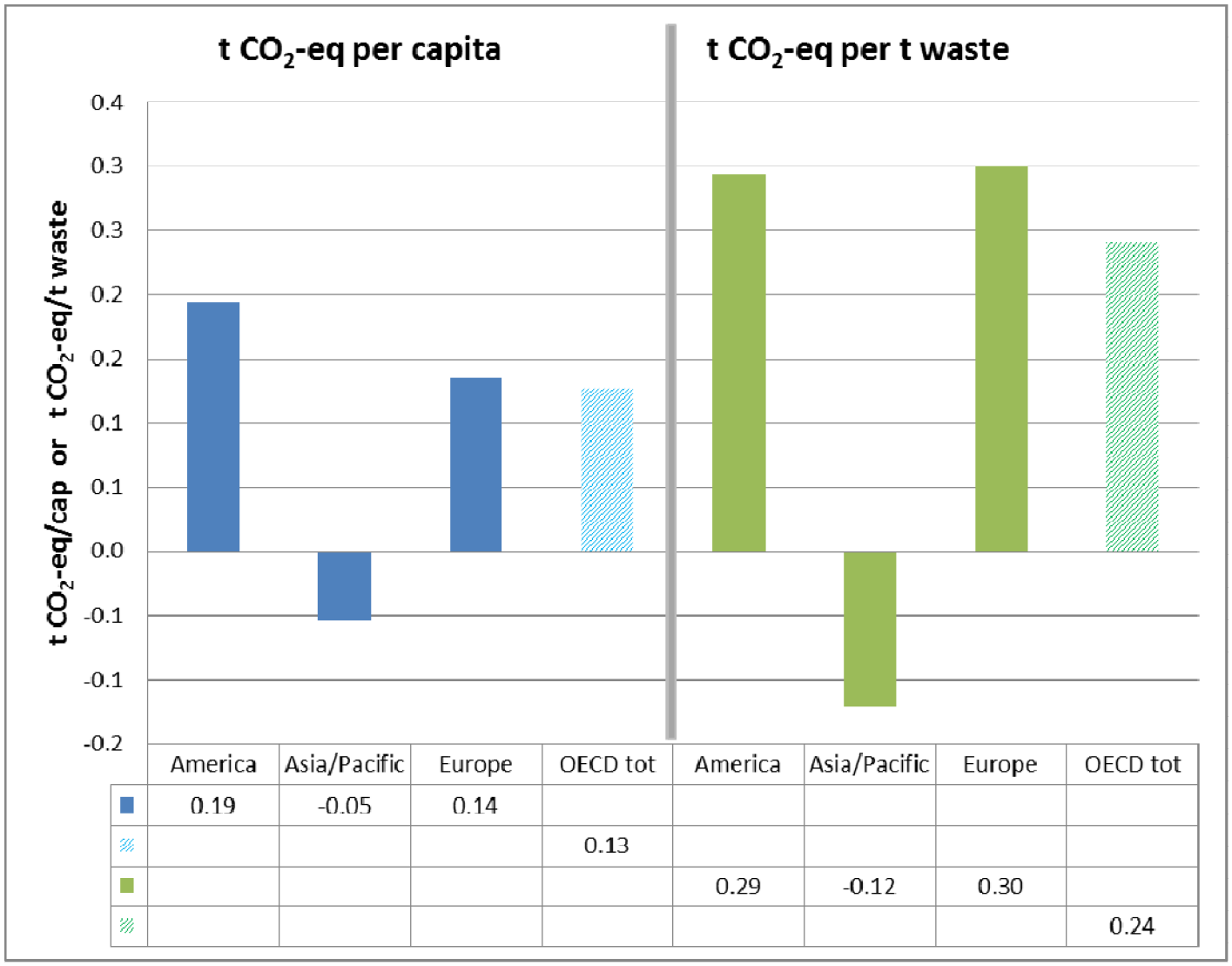
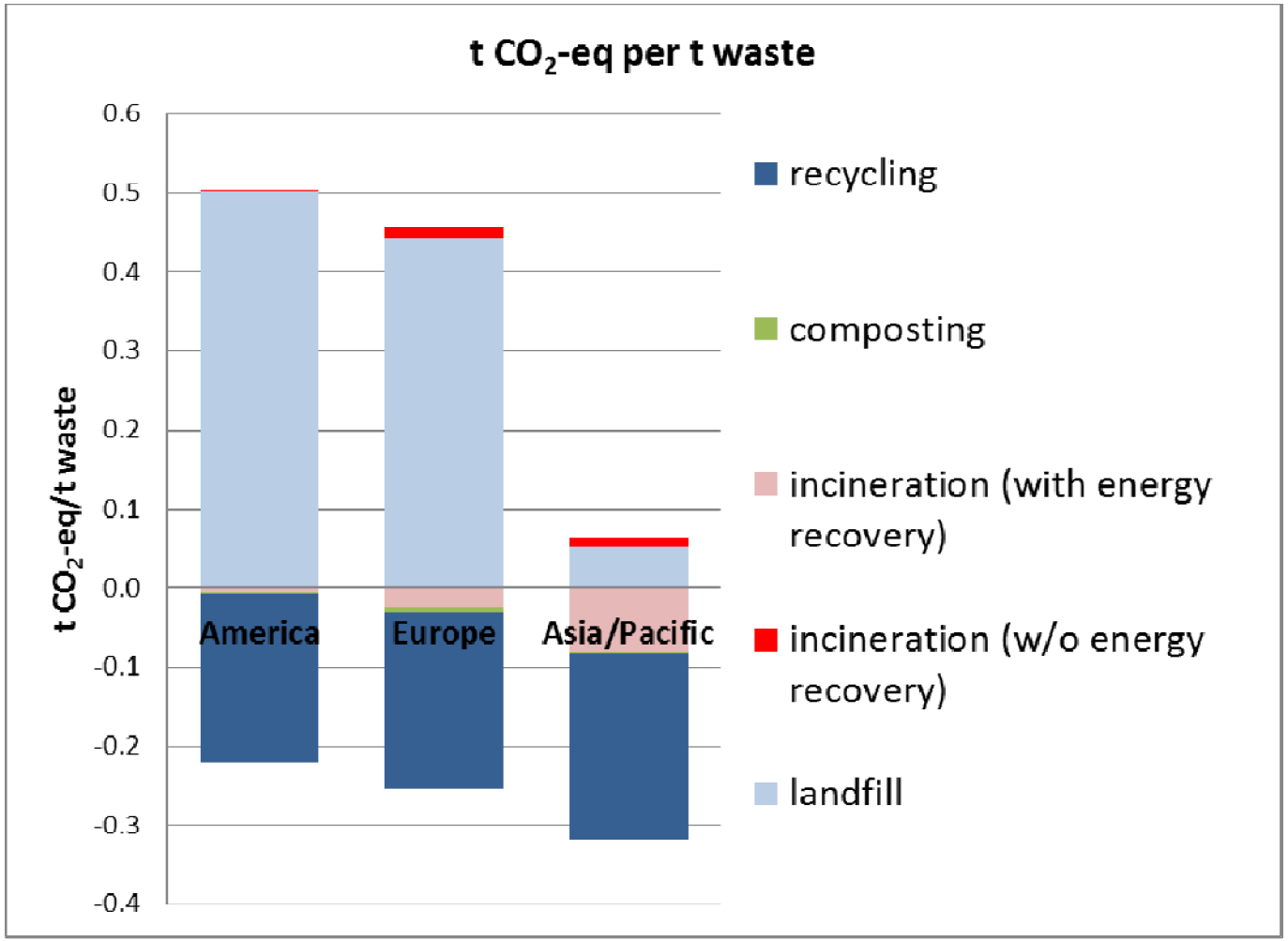
GHG Balance: Baseline



	America	Asia/Pacific	Europe	OECD tot	America	Asia/Pacific	Europe	OECD tot
■	0.19	-0.05	0.14					
▨				0.13				
■					0.29	-0.12	0.30	
▨								0.24

Influence of treatment technologies on baseline



- Recycling makes up the largest part of the credits
- Landfill of untreated MW causes the highest climate impacts

Some remarks on methodology (1)

- To some extend different application of the definition / coverage of Municipal Waste*.
- Some countries report difficulties to apply the definition for recycling**.
- Eurostat and OECD are spending currently high attention to harmonies application of the given definitions.
- To our experience (as contractor of Eurostat) some of the difficulties level out for the highly aggregated data applied for this assessment.
- To our opinion this does not apply for the issue recycling. Therefore the recycling might be overestimated for the baseline scenario.

Some remarks on methodology (2)

- The level of effective gas collection is (globally) in discussion*.
- OECD / Eurostat reporting refers to final treatment only. It is known that some countries report some MBA output as landfilled**.
- National energy mix has relevant effects on credits for incineration with energy recovery***.
- More detailed Emission Factors by country might improve the accuracy of numbers. However we are convinced that the trends and order of magnitude are correct.

Assumptions for the scenarios 2030

- Status quo scenario:
  - No changes in waste management in 2030
- Medium scenario:
  - landfill -50 % (plus more effective gas collection)
  - Recycling (incl. composting) rates as mean derived from rates of status quo and ideal scenarios
  - Remaining waste: 80 % incineration with energy recovery and 20 % in MBT
- Ideal scenario:
  - landfill 0%
  - Recycling rates (incl. composting) are twice the rates from status quo (at least 50 % max. 70 %)
  - Remaining waste: 80 % incineration with energy recovery and 20 % in MBT

Treatment technologies scenarios 2030

	Recycling & composting	Landfill	Incineration (w/o ER)	Incineration (with ER)	MBT
America					
Status quo	32%	58%	0%	9%	0%
Medium	47%	29%	0%	19%	5%
Ideal	68%	0%	0%	25%	6%
Europe					
Status quo	33%	44%	4%	18%	0%
Medium	51%	22%	0%	21%	5%
Ideal	70%	0%	0%	24%	6%
Asia/Pacific					
Status quo	36%	16%	4%	43%	1%
Medium	50%	8%	0%	34%	8%
Ideal	64%	0%	0%	29%	7%
OECD total					
Status quo	33%	47%	2%	17%	0%
Medium	49%	23%	0%	22%	6%
Ideal	68%	0%	0%	25%	6%

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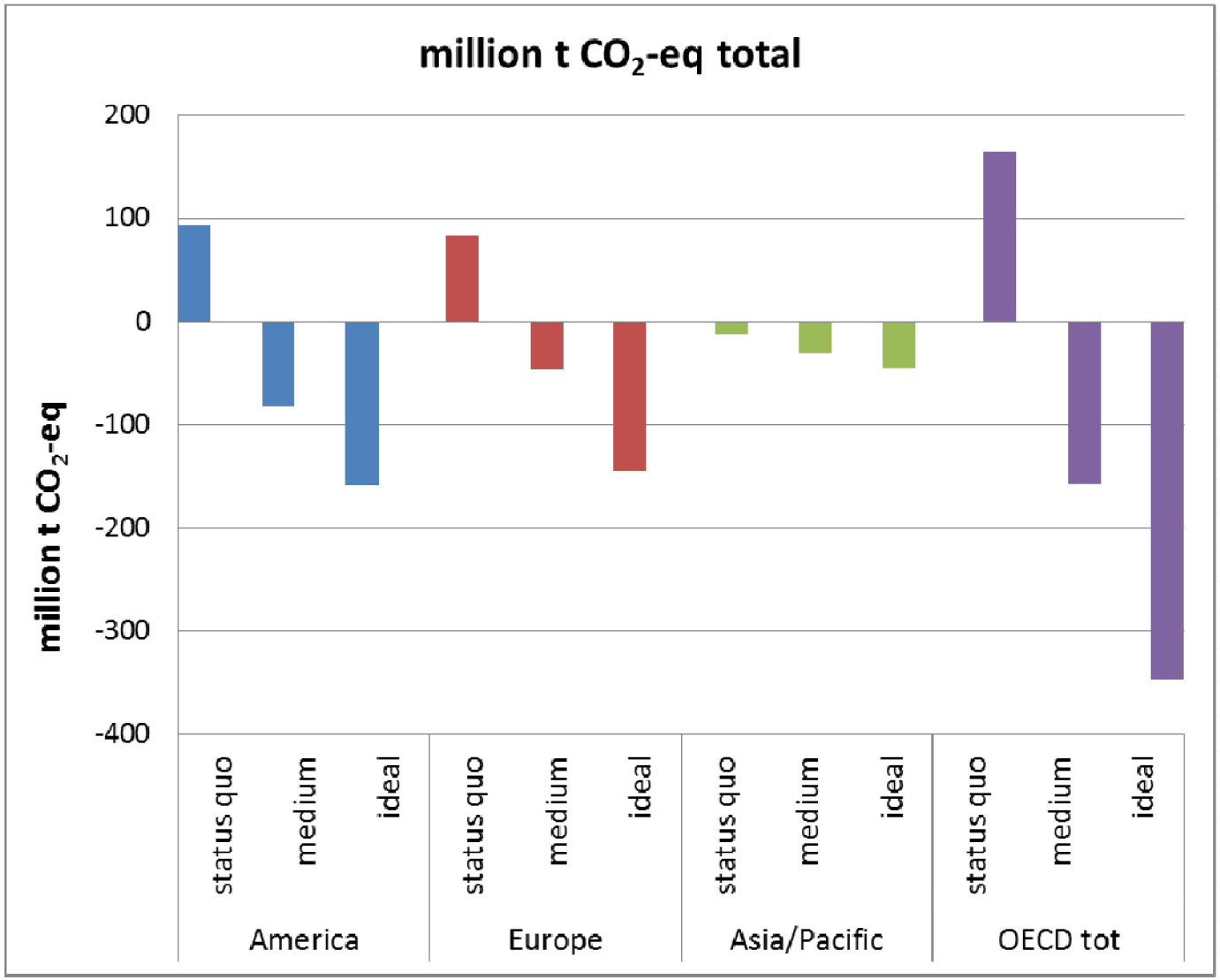
Comparison of the results of the scenarios 2030



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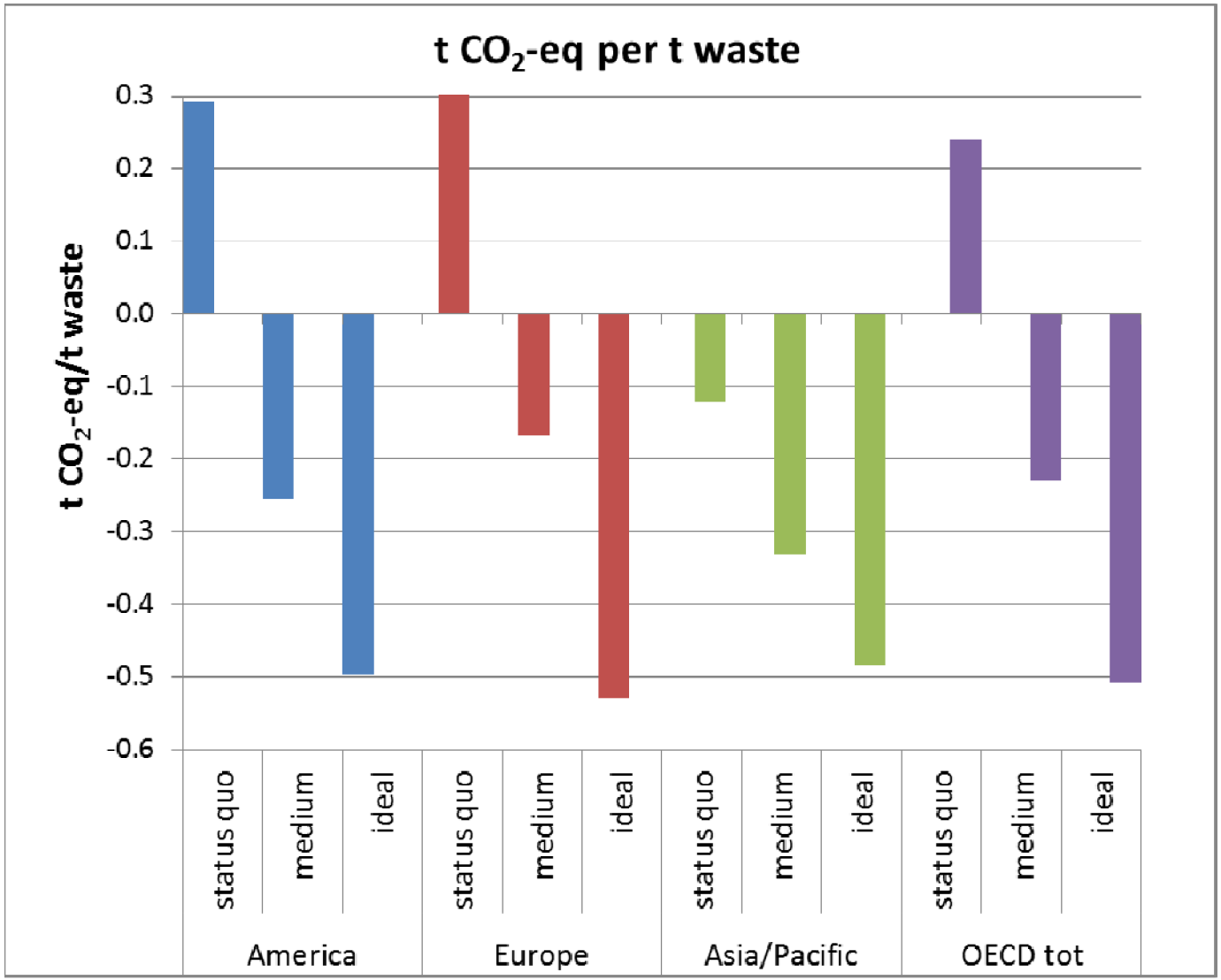

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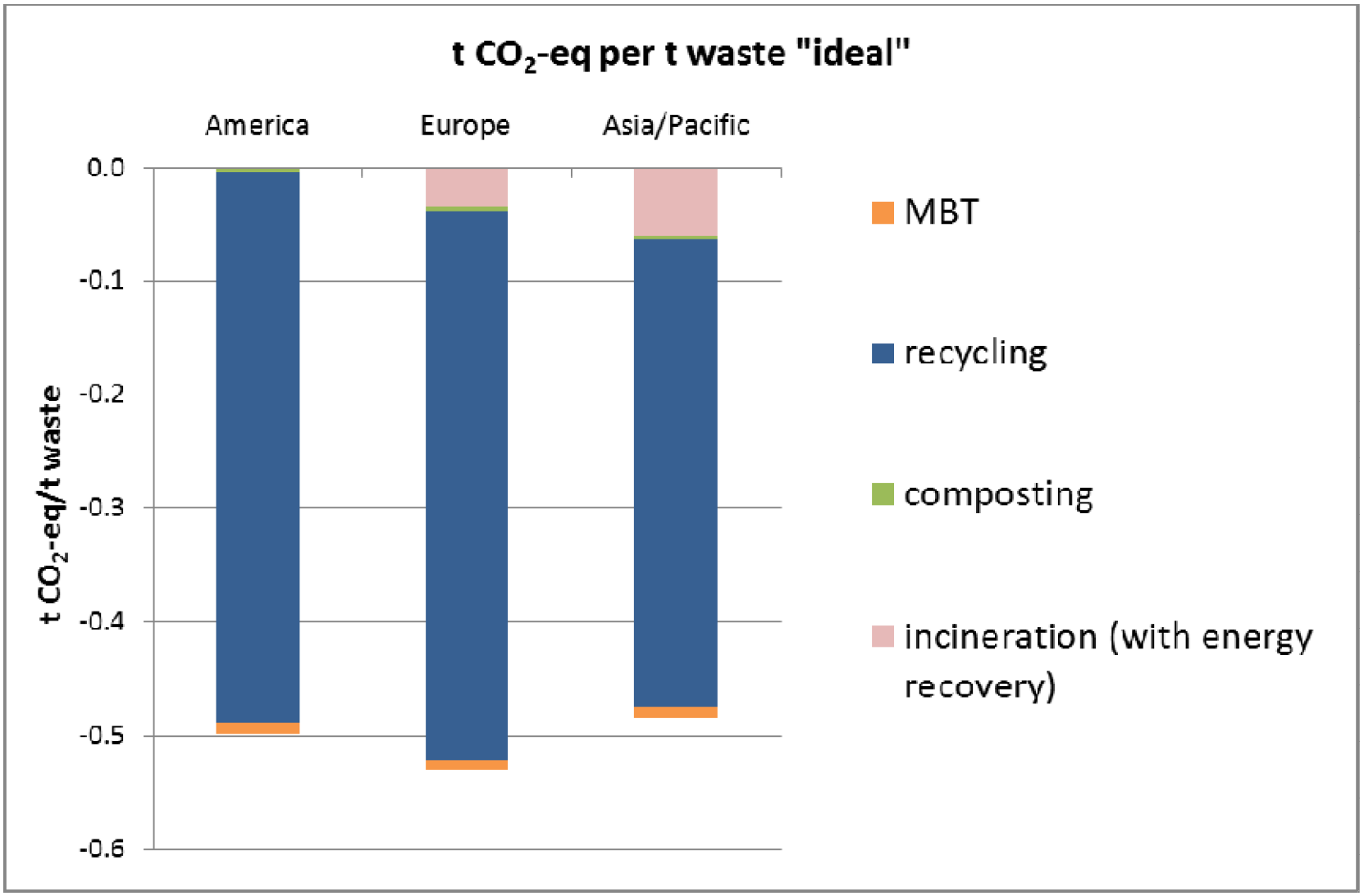

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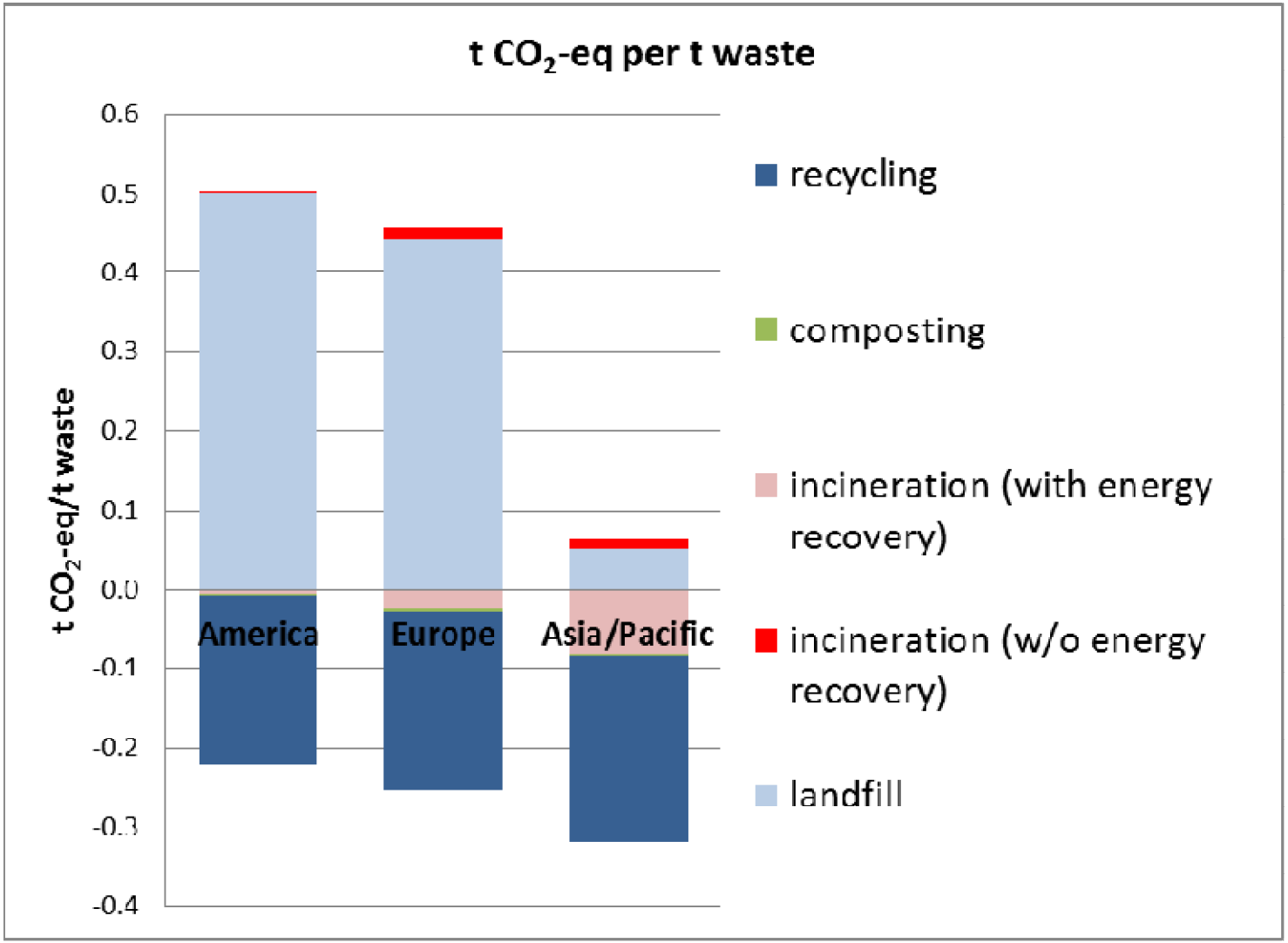
Recall: the baseline scenario



Comparison of the results of the scenarios 2030

	Total [mio. t CO_2]	Per capita [t CO_2/ cap]	Per t waste [t CO_2/t waste]
America			
“status quo"	93	0.194	0.294
“medium"	-81	-0.169	-0.255
“ideal"	-163	-0.328	-0.497
Europe			
„status quo"	83	0.138	0.303
"medium"	-46	-0.076	-0.168
"ideal"	-145	-0.241	-0.530
Asia/Pacific			
„status quo"	-11	-0.054	-0.121
"medium"	-30	-0.148	-0.331
"ideal"	-44	-0.216	-0.485
OECD total			
„status quo"	165	0.128	0.242
"medium"	-157	-0.122	-0.230
"ideal"	-347	-0.270	-0.509

Conclusions

- The reduction potential is relevant:
  - The ideal scenario amounts to 512 million tons CO2-eq emission reduction*
  - Recall: EU 2020 emission reduction target: -600 million tons per year
- Even if some methodological shortcomings apply, the general trend and the order of magnitude is robust.
- Most significant improvements are linked to the expansion of recycling as well as the reduction of landfilling of untreated MW.
- (high) credits for incineration (with ER) apply for countries with high $CO_{2\text{-}eq}$ emissions for power generation. In the context of global warming these credits must decline remarkably until 2030**. In results the displayed credits for incineration might be even less relevant than displayed.
- To support the reduction of landfilling, two alternative treatment technologies can be used for the remaining waste:
  - Incineration with Energy Recovery: see conclusion above
  - MBT (incl. sorting for recycling and treatment for disposal): if properly applied the option “Fuel from Waste” is of relevance

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Thank you!

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