



Bioenergy NoE



# Residential Waste - an often overlooked bioenergy source



J. Vehlow

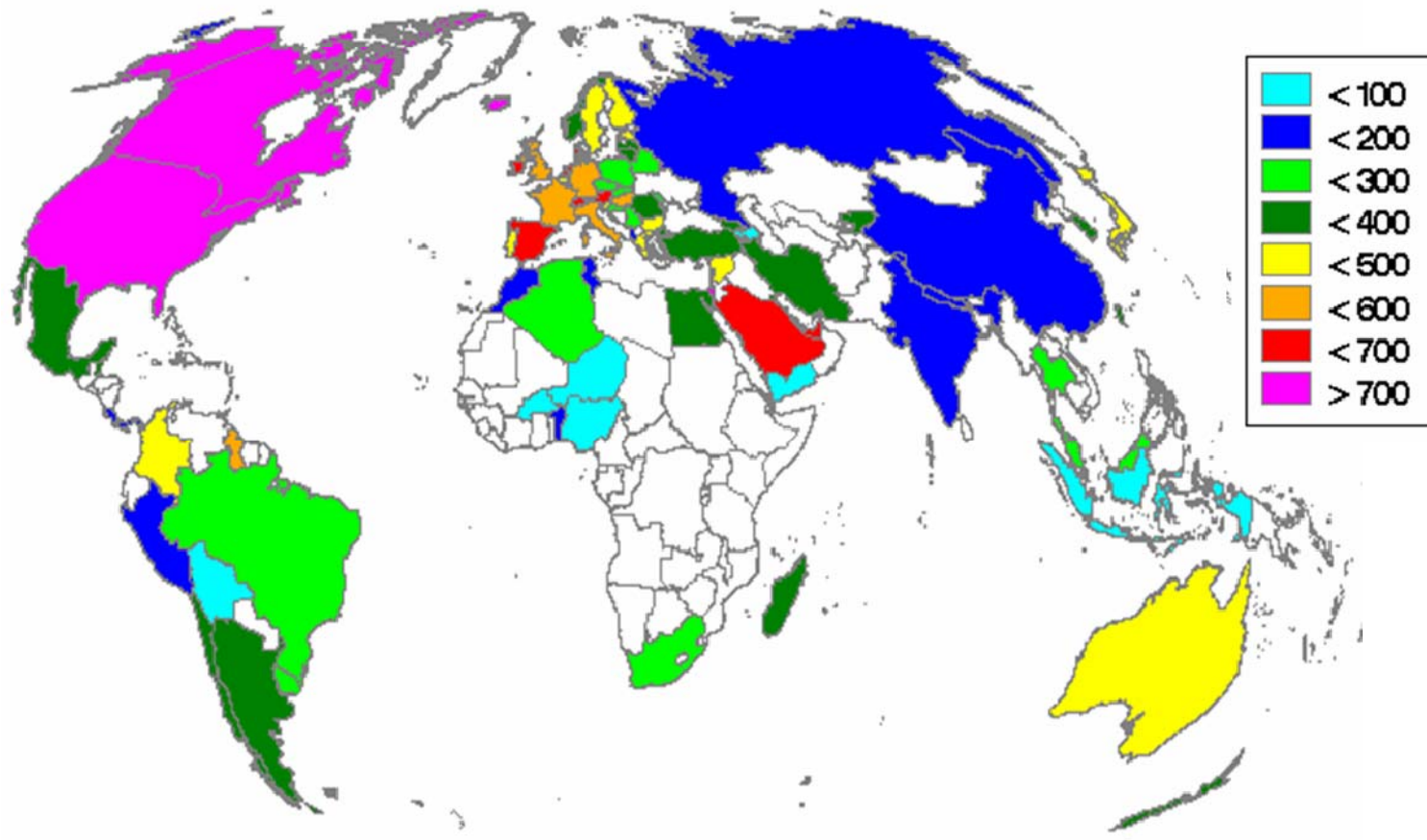
**Forschungszentrum Karlsruhe GmbH**  
**Institute for Technical Chemistry / Thermal Waste Treatment Division**



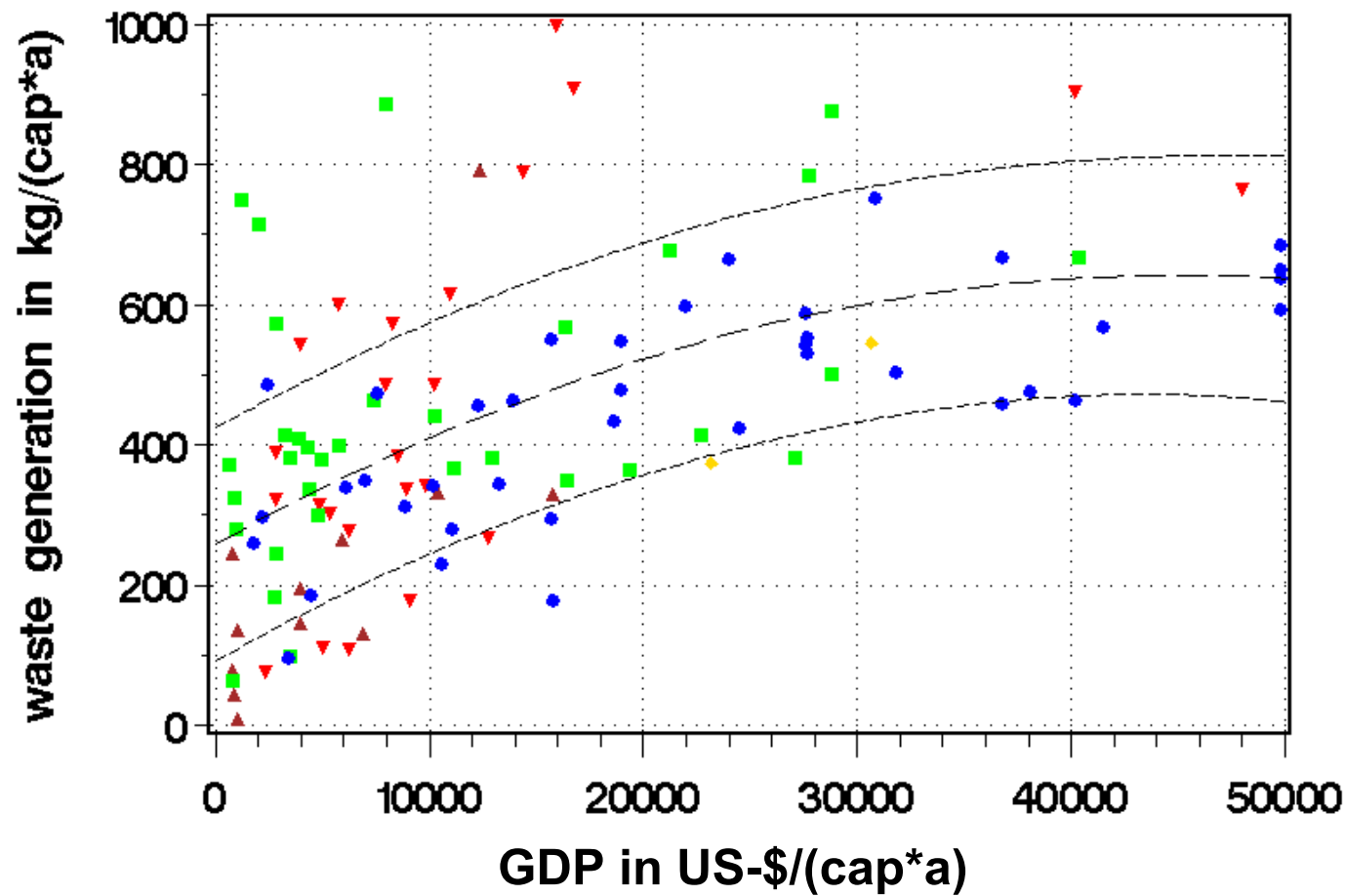
## **specific drivers for energy recovery from waste**

**modern waste management strategies for aftercare-free disposal**

- ▶ **ban of direct landfilling of reactive waste to avoid**
  - landfill gas evolution (climate protection)
  - leachate formation (groundwater protection)
  
- ▶ **inertisation prior to final disposal**
  - preferentially by waste incineration
  - demand for residue utilisation and
  - energy recovery



generation of MSW in kg/(cap\*a)

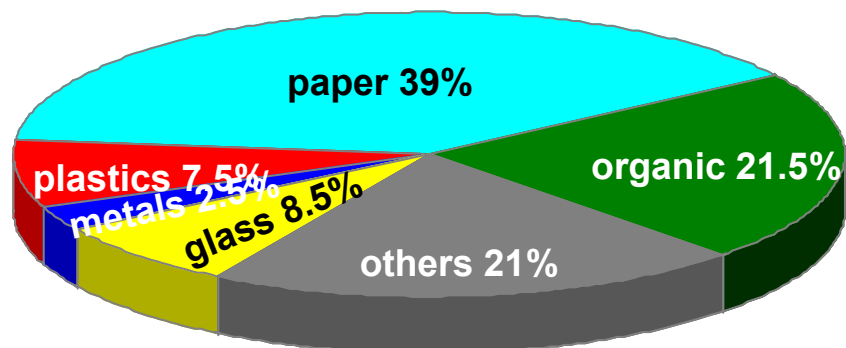


## waste generation versus GDP

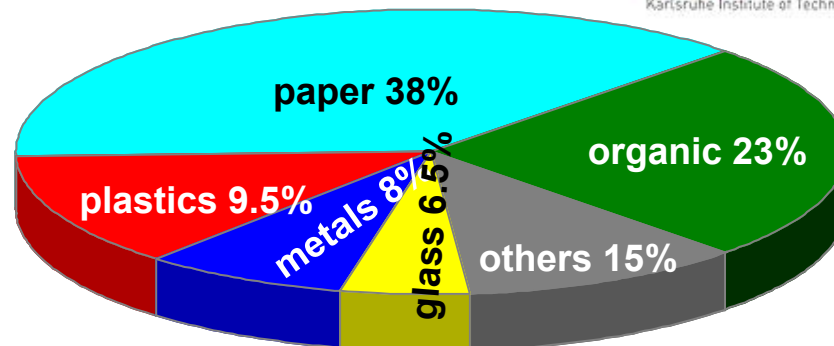




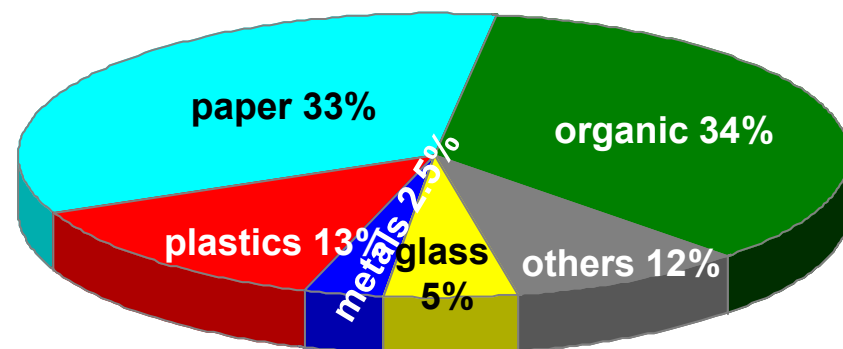
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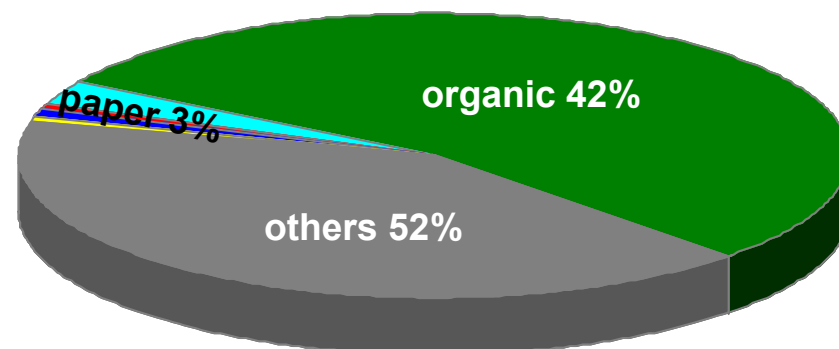
Germany 570 kg/(cap\*a)



USA 770 kg/(cap\*a)

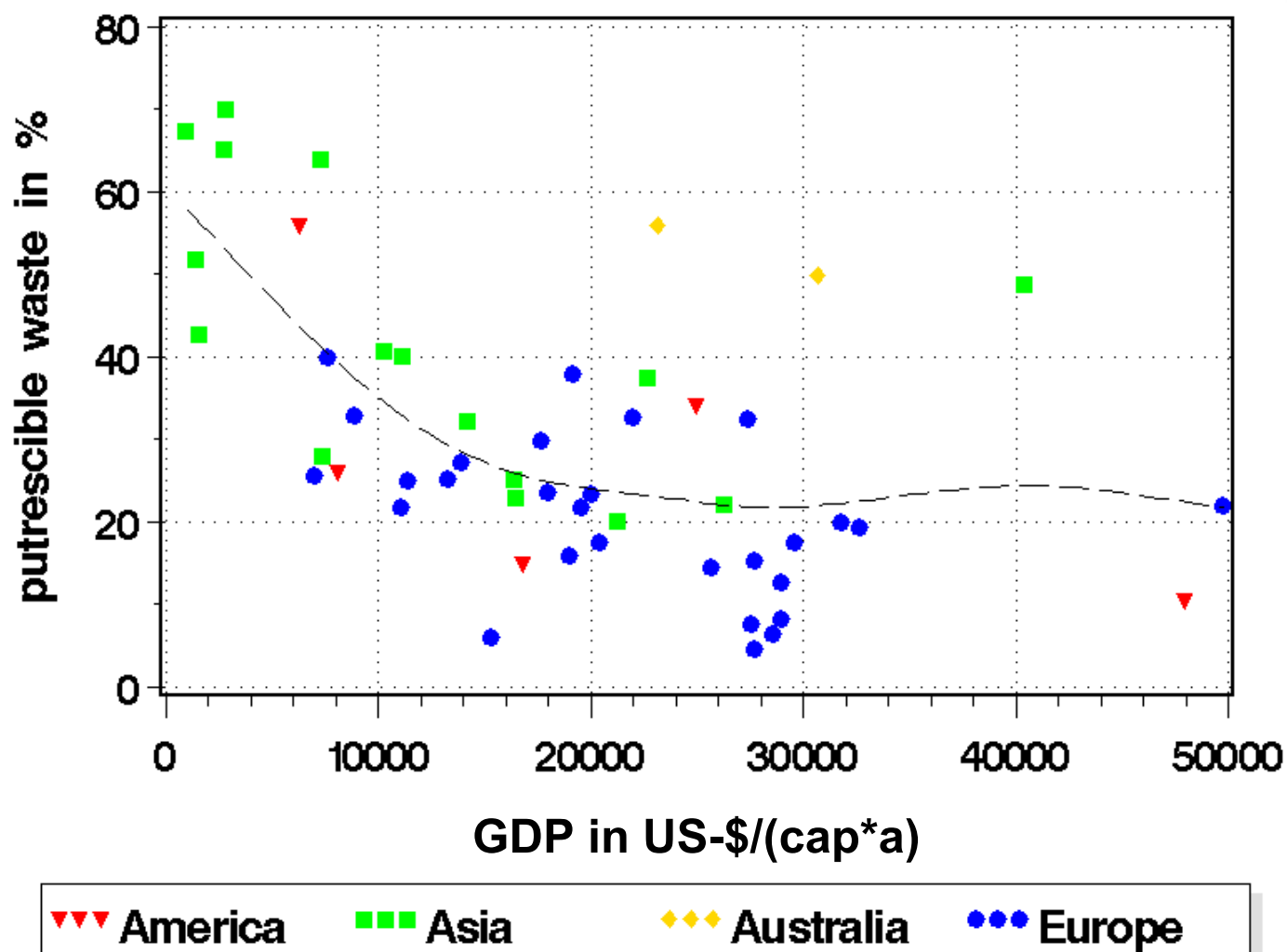


Japan 430 kg/(cap\*a)

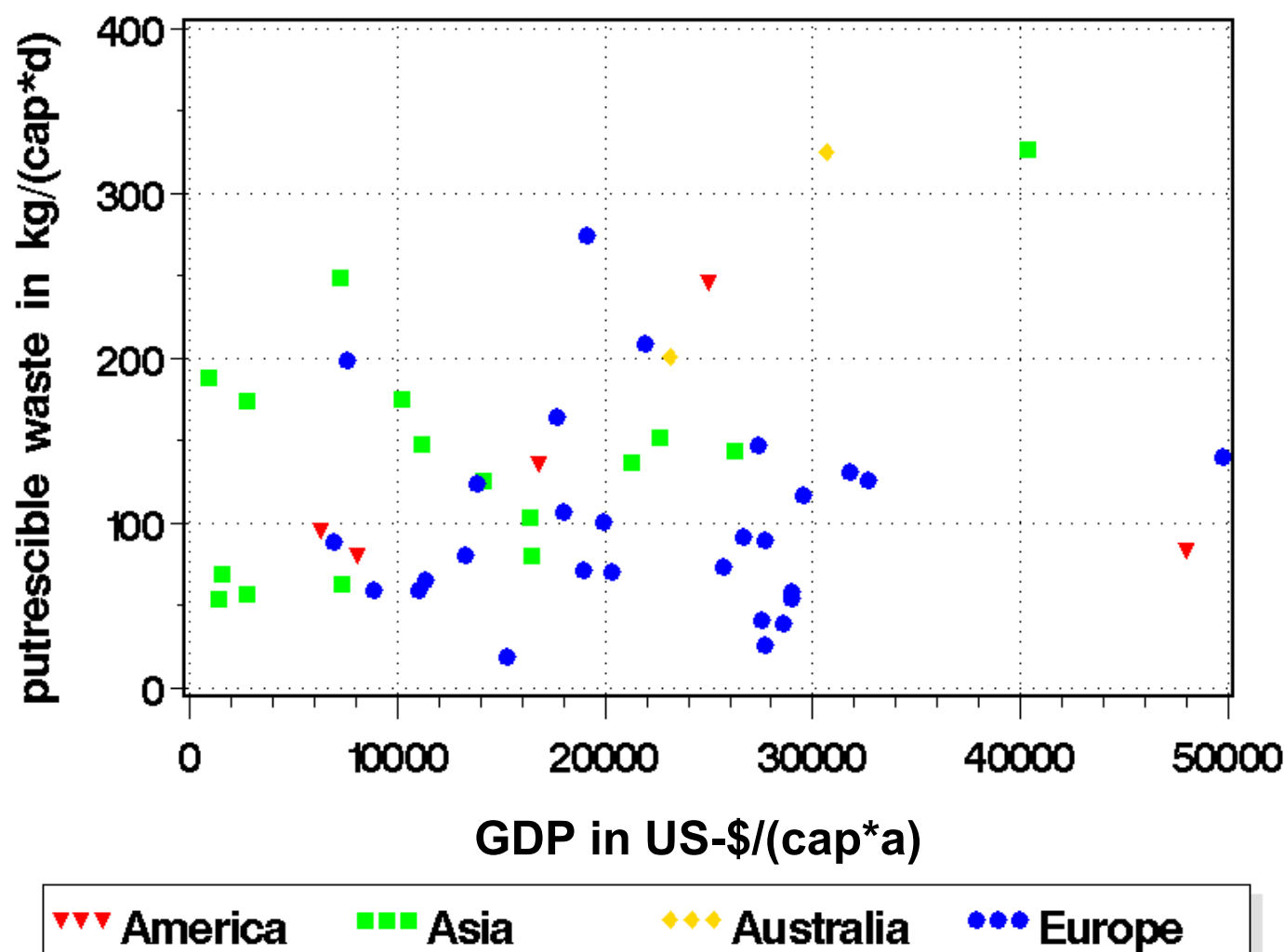


Vietnam 106 kg/(cap\*a)

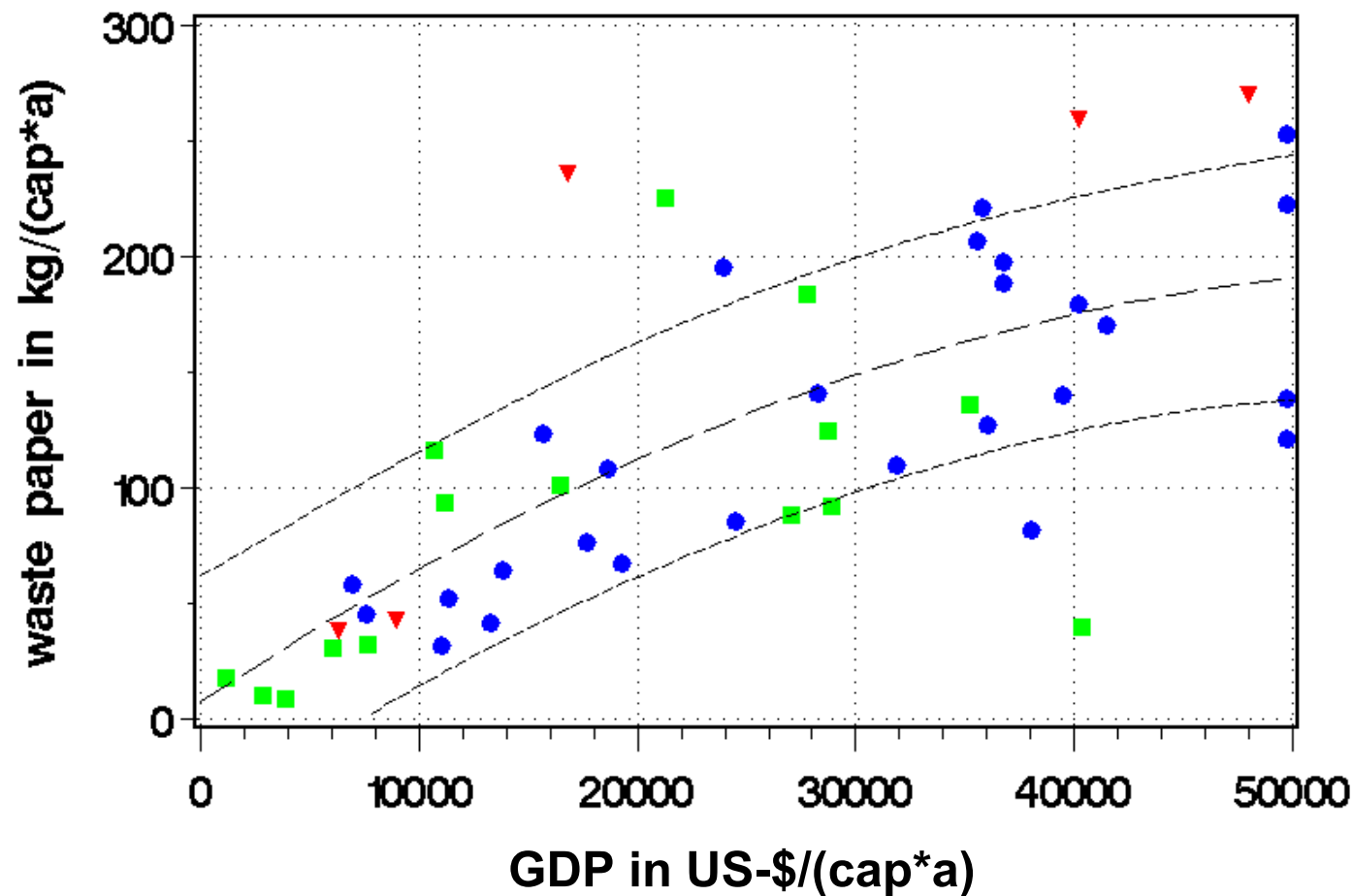
waste composition



share of organic waste versus GDP

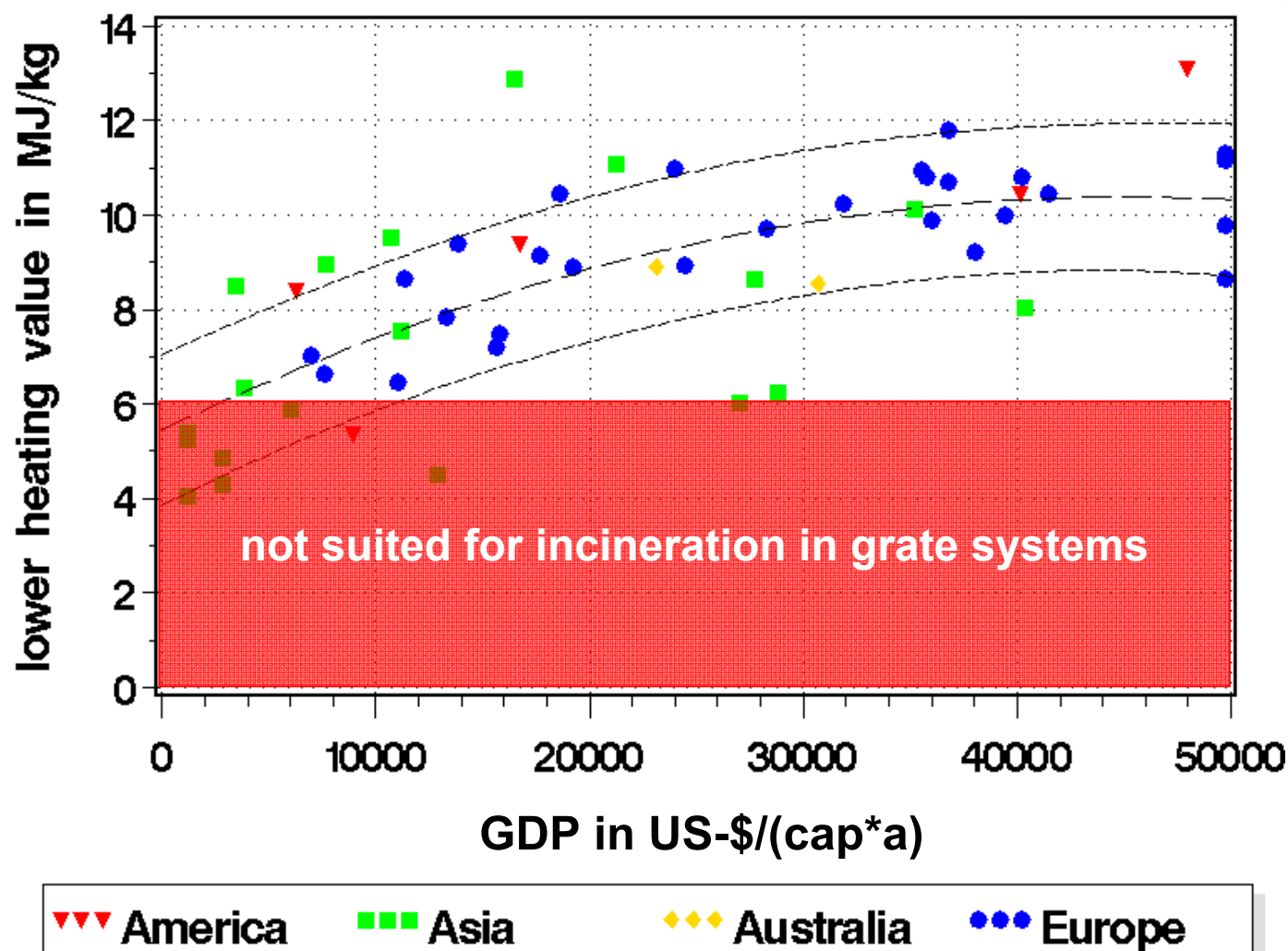


**generation of organic waste versus GDP**

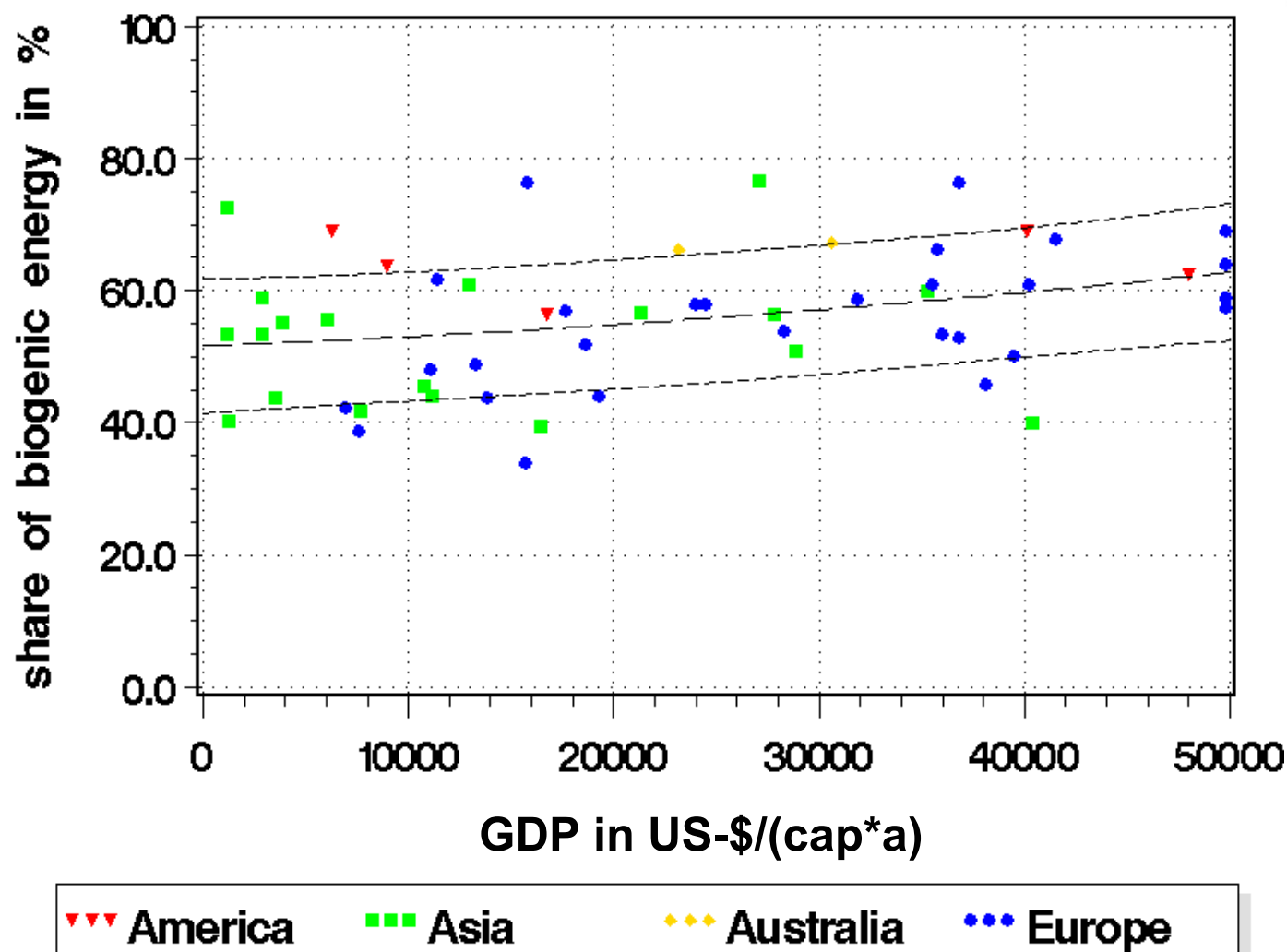


generation of waste paper versus GDP

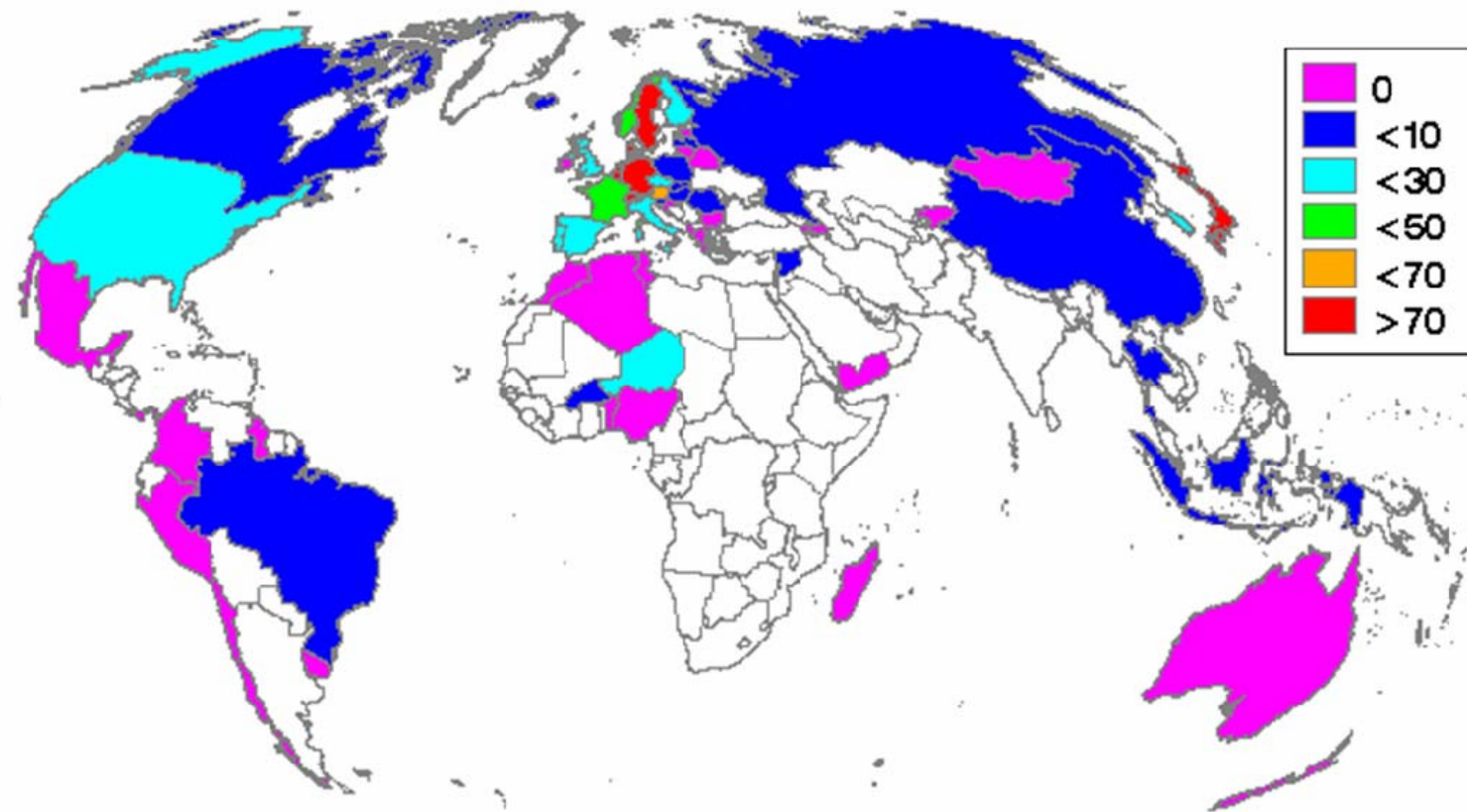




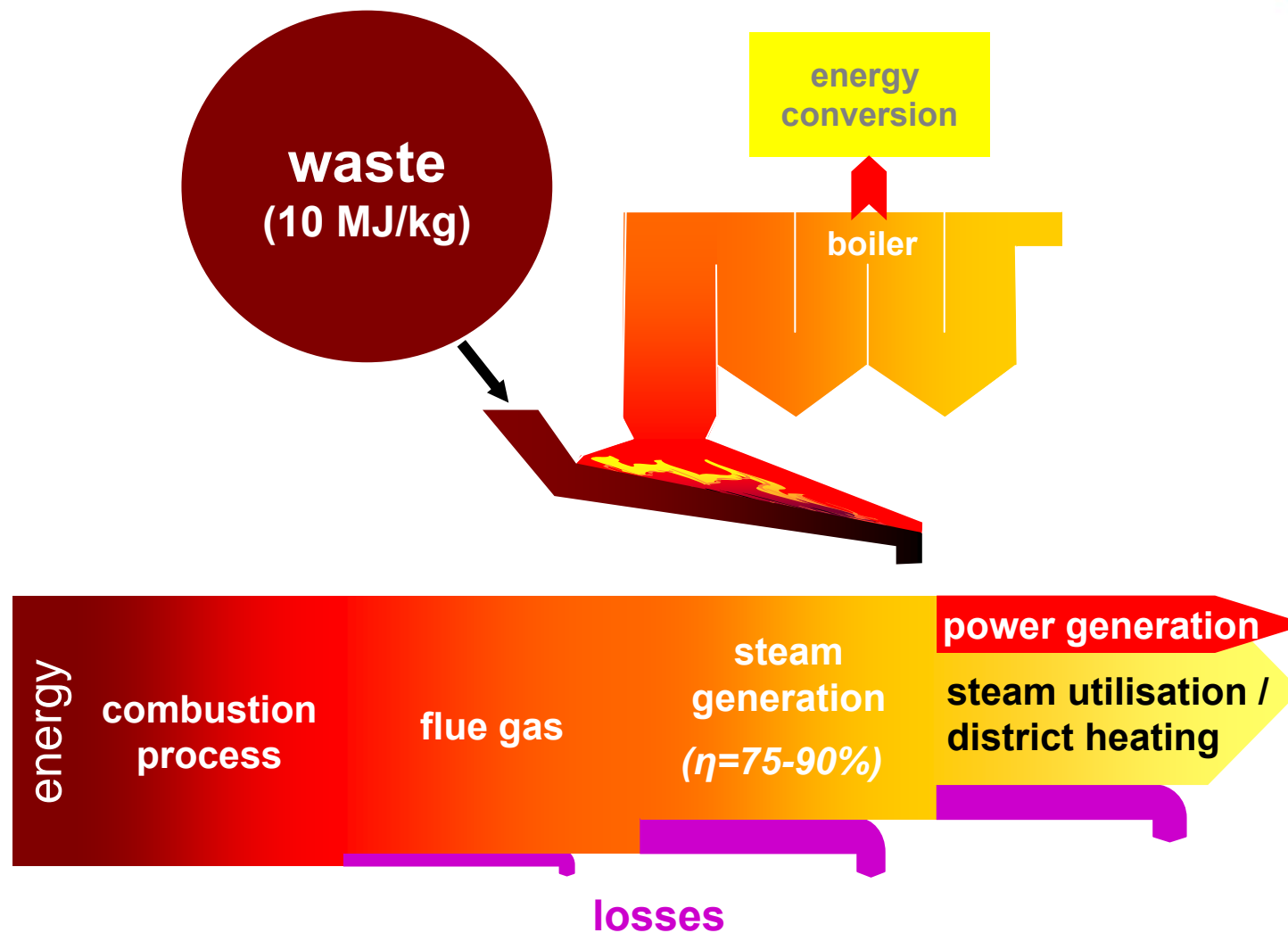
lower heating value versus GDP



biogenic energy fraction in MSW in %



**incineration of residual MSW in %**



## energy flow in a waste incinerator



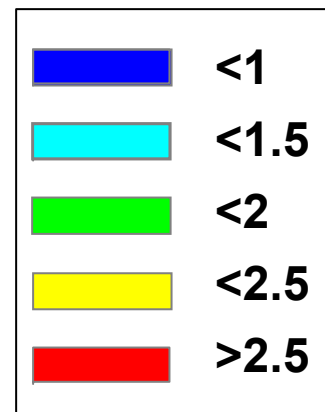
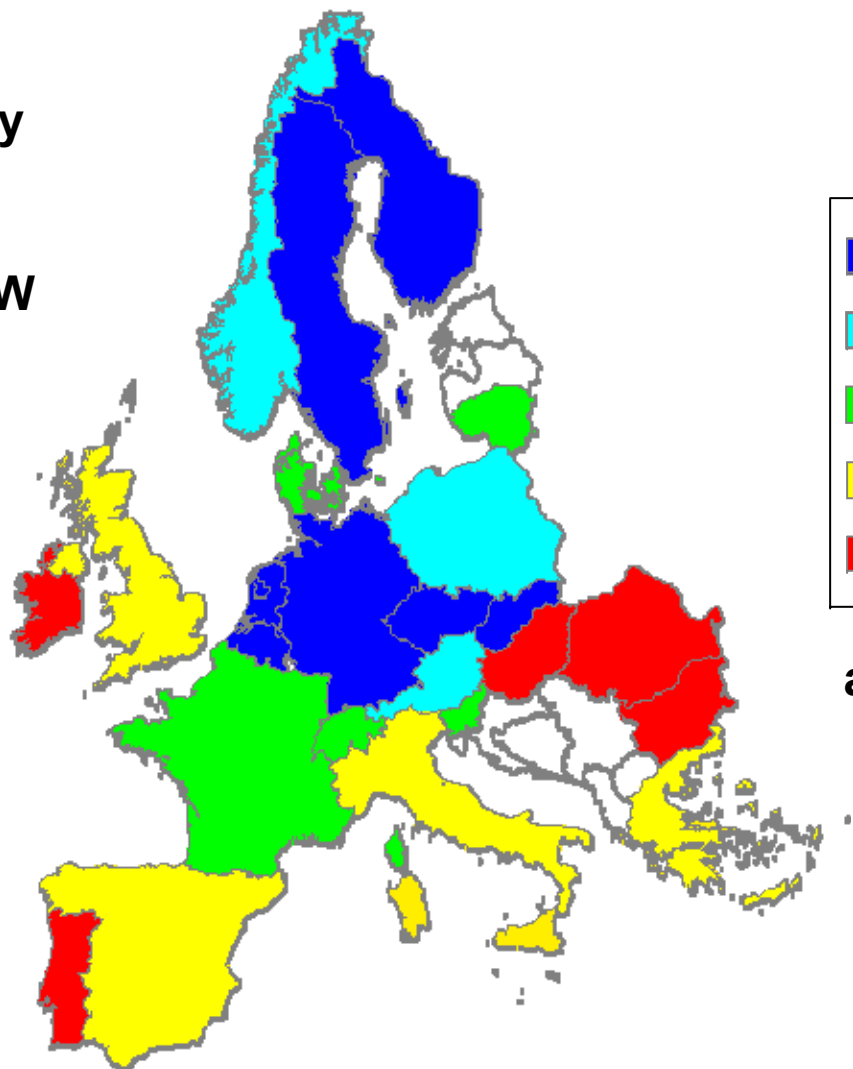
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primary energy  
79 500 PJ

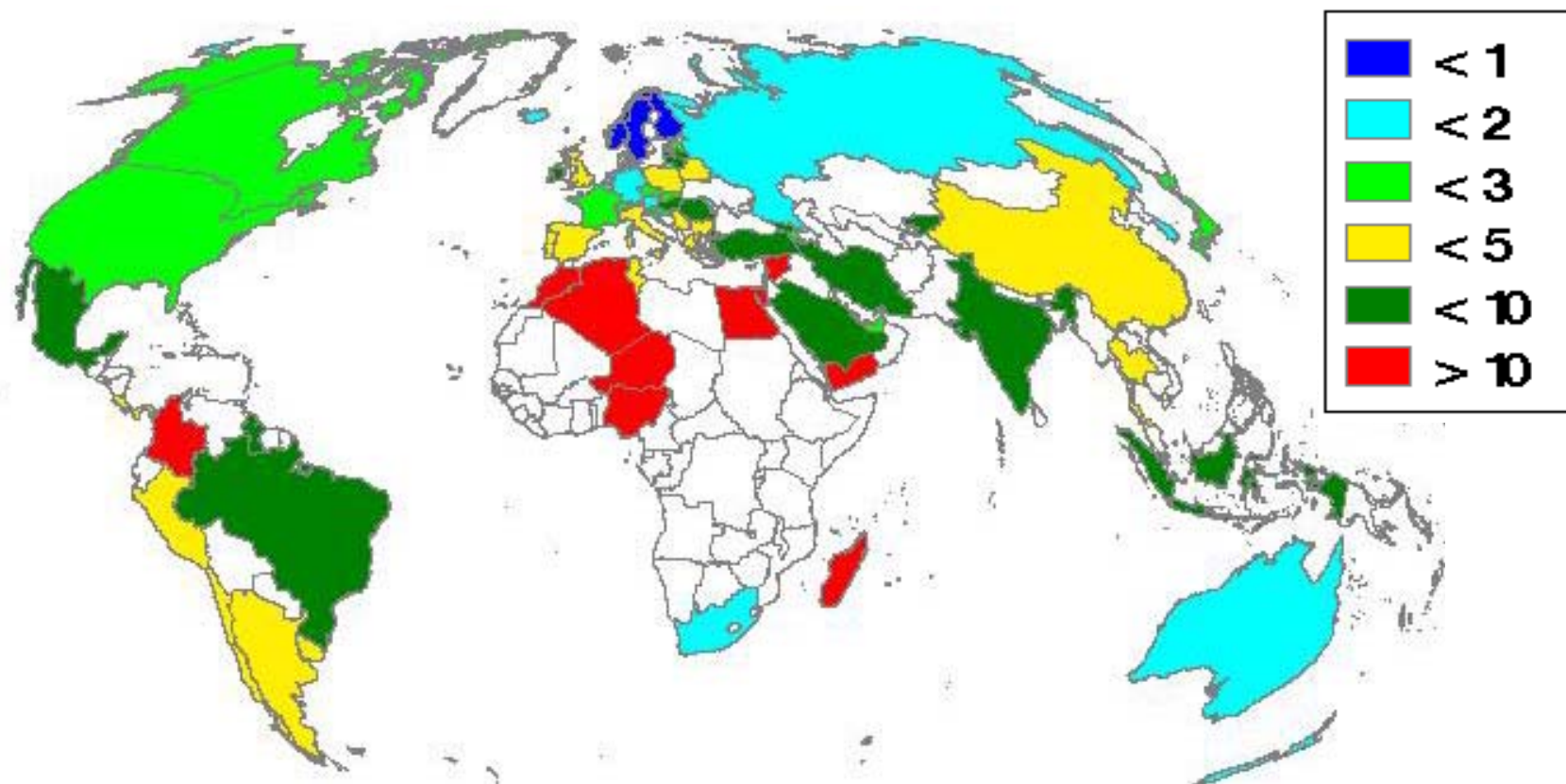
2006 from MSW  
230 PJ

potential  
1 065 PJ



average 1.5

potential primary energy supply by MSW in EU (%)



**potential of MSW for power supply in %**





## conclusions

- waste incineration with energy recovery is a suited method for MSW inertisation prior to final disposal
- generation and heating value of MSW are correlated with the economic power of a country
- LHV in industrialised countries 8 – 11 MJ/kg
- MSW can supply of 1 – 2 % of primary energy or
- 2 - 4 % of power demand
- 50 – 70 % of the energy inventory of MSW are biogenic
- the respective CO<sub>2</sub> emission is climate neutral
- **energy recovery as by-product of waste incineration is a small but constant bioenergy source and should hence be exploited as far as possible**

## outlook

- countries exploiting energy from waste will see this becoming one of the fastest growing bioenergy sectors in near future



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## **contacts**

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**EU Network of Excellence  
'Overcoming Barriers to Bioenergy'**

**[www.bioenergy-noe.org](http://www.bioenergy-noe.org)**