



## Electricity production from Swiss non-woody biomass: Assessment of resources, technologies, and costs

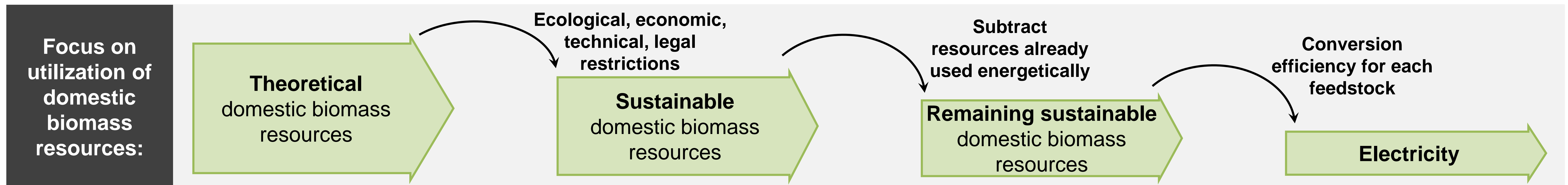
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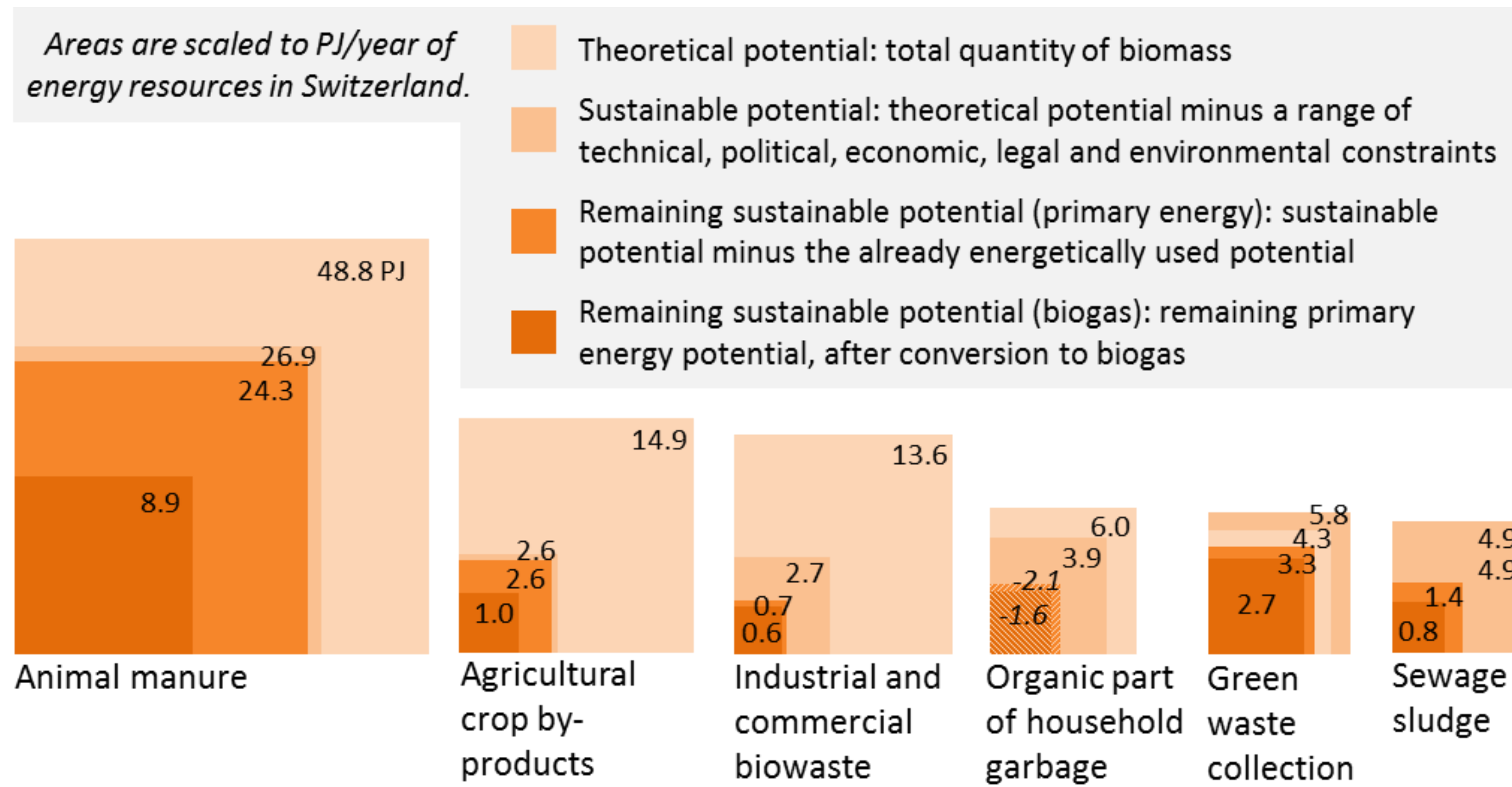
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### Introduction

Swiss domestic biomass resource potentials are assessed, first on a primary energy basis and then as electricity generation potentials. Costs are also estimated.

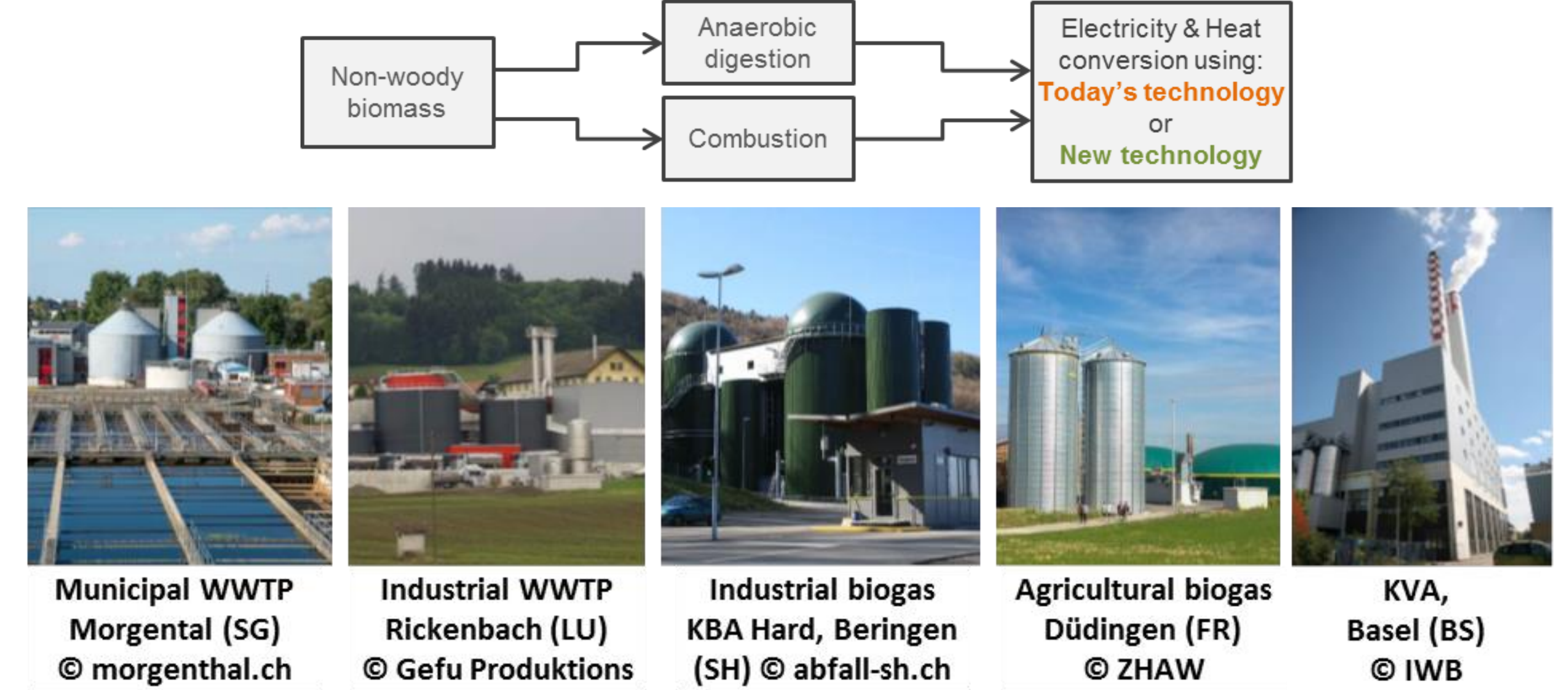


### Resource Assessment



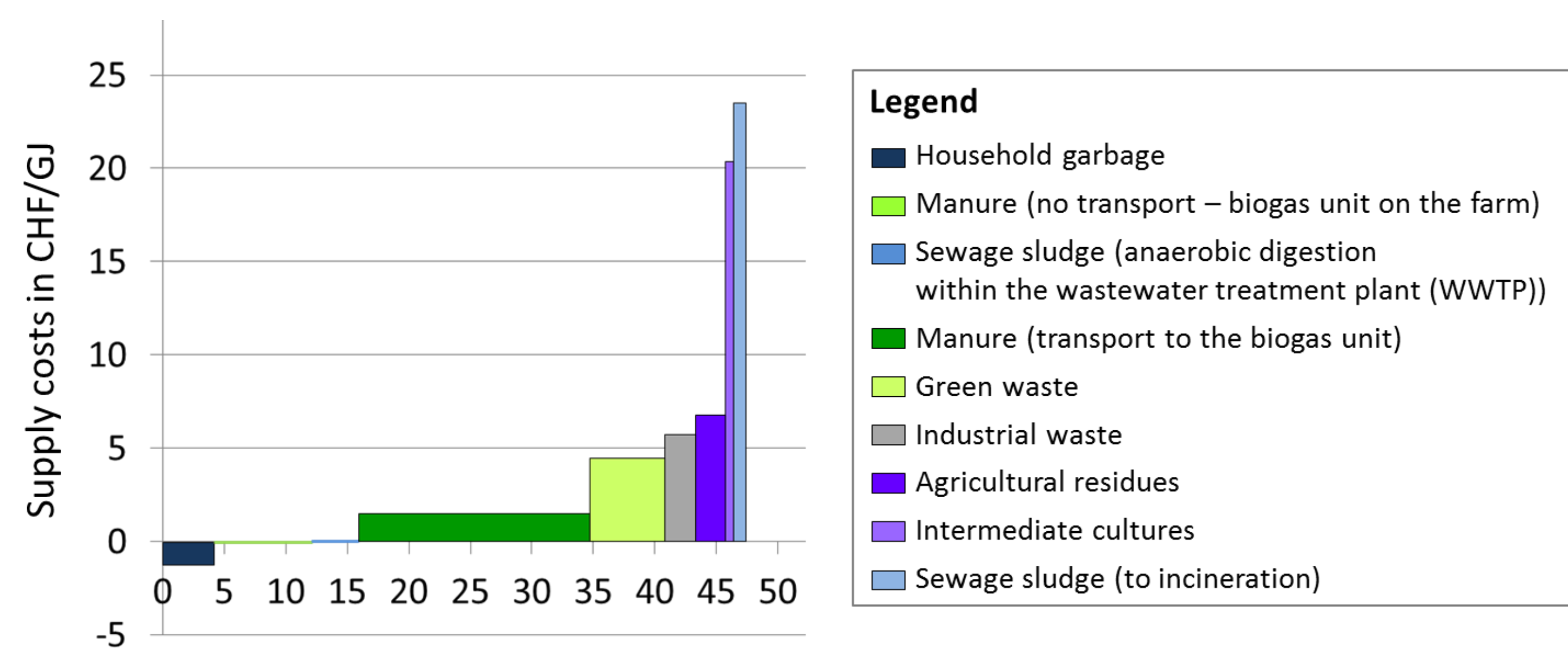
### Electricity Conversion Paths

Technology categories from BFS/BFE energy statistics considered for non-woody biomass:



### Economic Considerations: Feedstock Costs

Supply costs and biomass sustainable potentials for primary energy in Switzerland



Sustainable potential for energetic use in PJ (according to price categories)

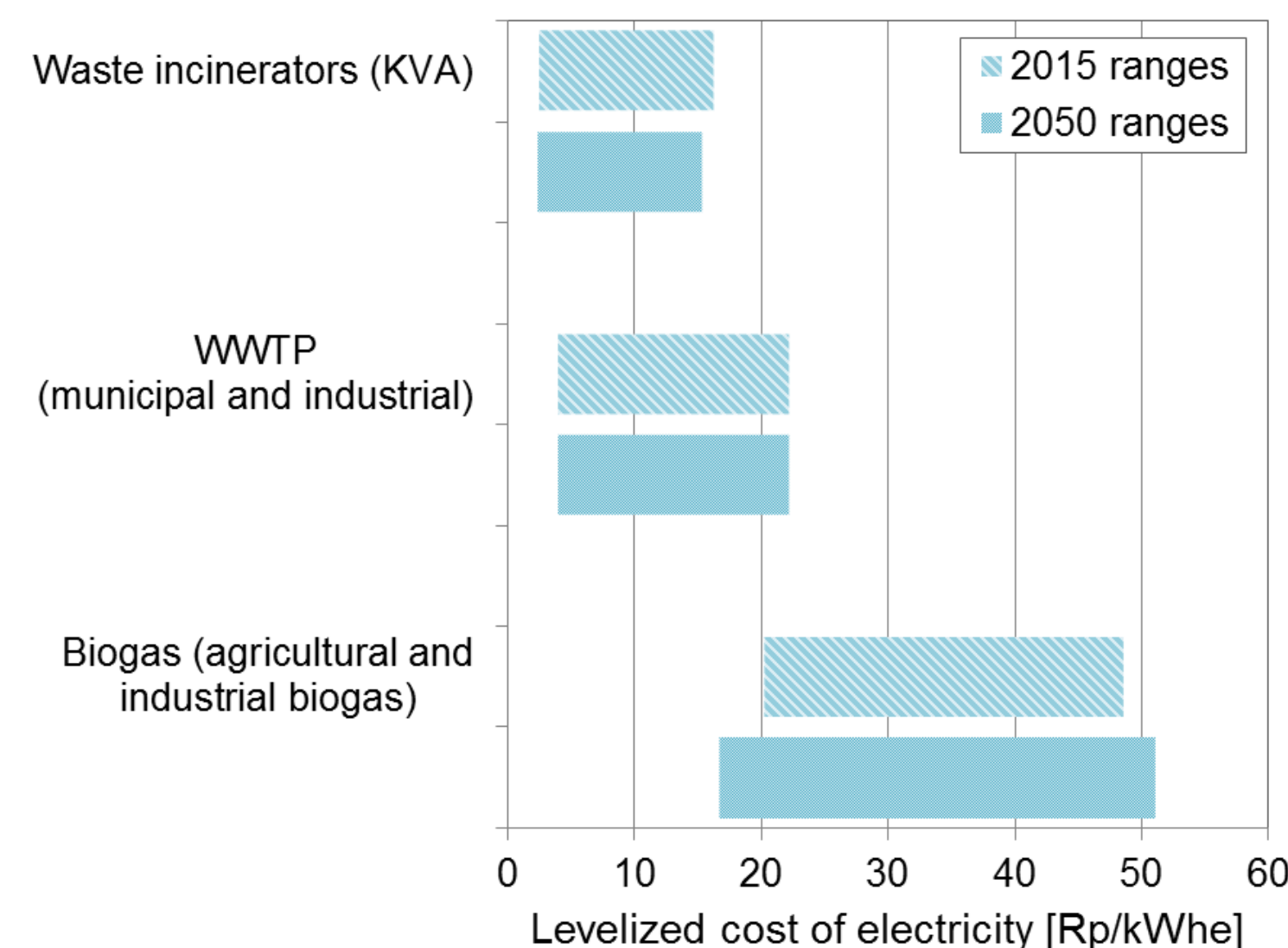
### Economic Considerations: Electricity Costs

Electricity costs depend on the business model of the sector:

	Income for processing waste	No waste processing income
Significant income from heat sales	Waste incinerators, wastewater treatment plants,	Wood-based systems
Low income from heat sales	some biogas plants	Small agricultural systems

Least expensive cost of electricity  
Most expensive cost of electricity

Electricity cost ranges by conversion tech (see top right column for technologies)

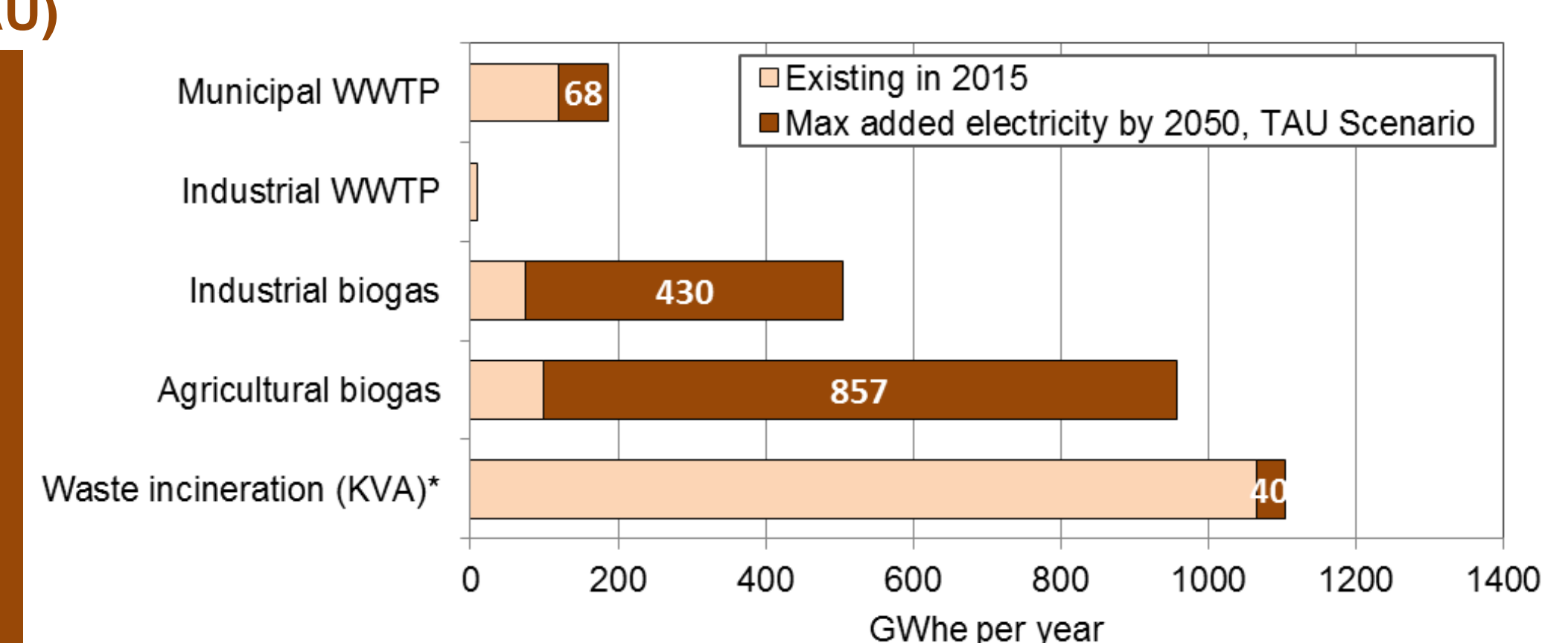


### Electricity Potentials: Today's Technology

Assumptions: Technology as Usual (TAU)

- Gradually use all remaining sustainable biomass feedstock in highest-efficiency of today's technology:
  - Biogas to engine; KVA to steam cycle
  - Efficiencies from 2015 Swiss Renew. Energy Statistics

Results: Electricity Potentials (GWh<sub>e</sub>)



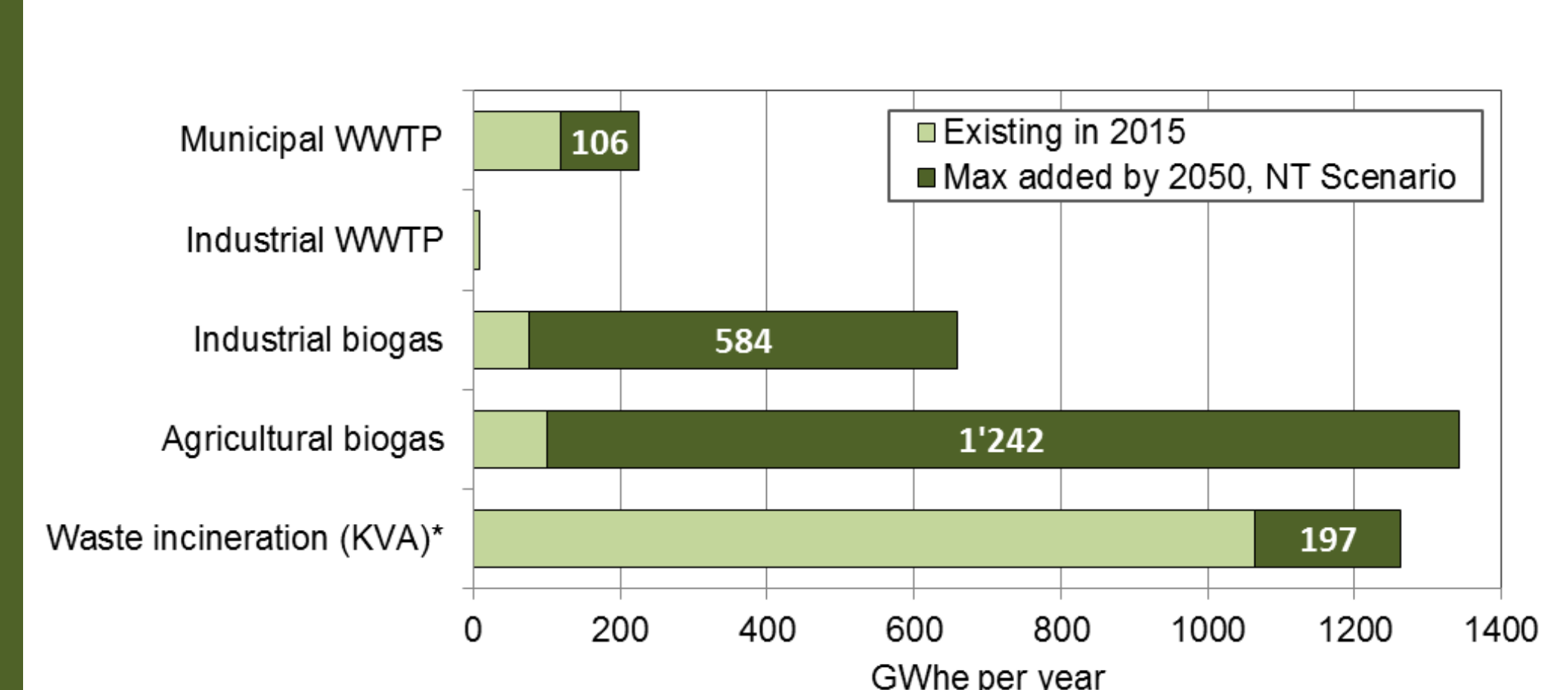
Max total added relative to 2015: 1.4 TWh<sub>e</sub> (5.0 PJ<sub>e</sub>)

### Electricity Potentials: New Technology

Assumptions: New Technology (NT)

- Gradually introduce new, higher-efficiency technologies:
  - SOFC (solid-oxide fuel cell) instead of engines for biogas conversion
  - Higher efficiency steam cycle for KVA
- Gradually use all remaining feedstock in these new technologies

Results: Electricity Potentials (GWh<sub>e</sub>)



Max total added relative to 2015: 2.1 TWh<sub>e</sub> (7.7 PJ<sub>e</sub>)

\*Note that this category includes woody and non-woody feedstocks.