

**ZeroWaste Byg**  
Redesigning construction materials towards zero waste society

DTU Byg  
Institut for Byggeri og Anlæg

**Waste as resource in construction materials** 

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September, 2013

## Redesigning construction materials towards zero waste society

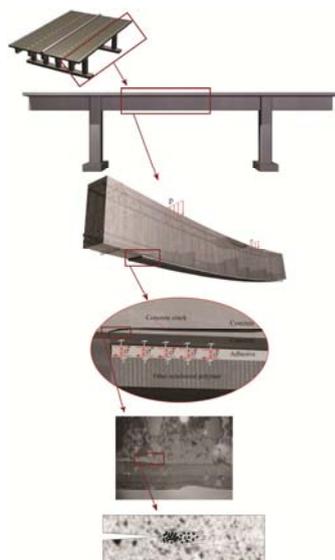
- We place the build environment centrally in a sustainable material cycle of the society
- We focus research and innovation on replacement of natural raw materials with secondary resources
- We rethink building technology and redesign materials for today's and tomorrow's demands
- We do not compromise on the quality of construction materials
- We do not compromise on environmental impact

ZeroWaste Byg is an interdisciplinary research team at Department of Civil Engineering, Technical University of Denmark. We have joined forces from all our department sections. Together we think innovative and untraditional to redesigning structures and construction materials to a zero waste society.

For more information please visit [www.zerowaste.byg.dtu.dk](http://www.zerowaste.byg.dtu.dk) or contact project leader Lisbeth M. Ottosen (lo@byg.dtu.dk)

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## From micro to macro scale.



Tool box for evaluating  
new secondary resources

Jacob W. Schmidt

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Electrochemical upgrading of different fly ashes for use in production of bricks and lightweight aggregates



Construction materials, Geotechniques and Geology, Structural engineering

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Hygro-thermal conditions and pollutant emissions from zero waste materials and their effects on humans



Barbora Krejcirikova, 2013

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## Alternative ashes in concrete – new aesthetics and structural performance

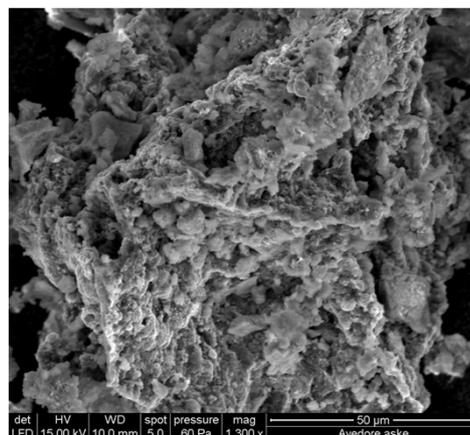


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## Upgrading secondary resources – simple processes

### Example sewage sludge ash in concrete

- Low content of heavy metals
- Low content of chlorides
- (Low content of sulphates)
  
- Rather coarse (up to 0.2 mm)
- The large particles are porous
  
- The phosphorous content is high (7-10 wt%)



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## Upgrading secondary resources – simple processes

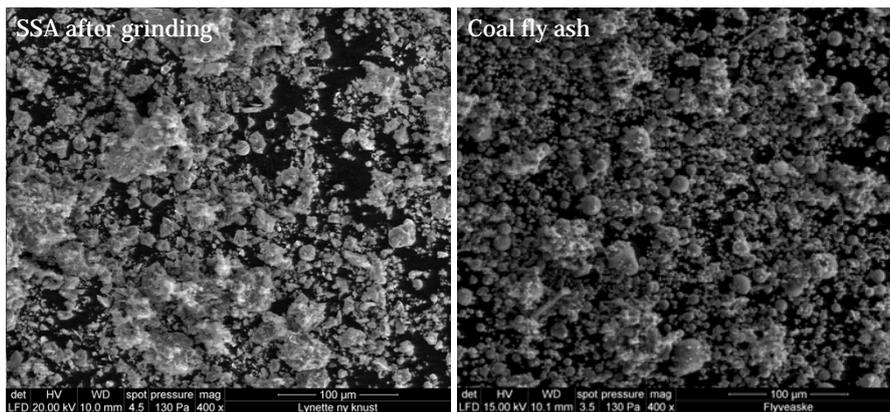
Example sewage sludge ash in concrete



# Grinding

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## Upgrading secondary resources – simple processes

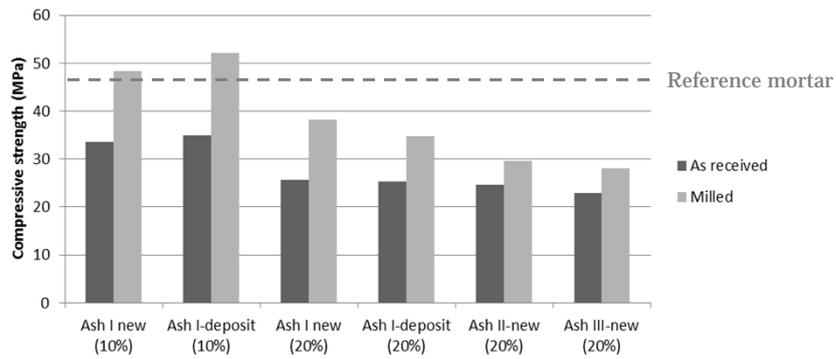


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## Upgrading secondary resources – simple processes

### Example sewage sludge ash in concrete – ash as received and grinded

(1) Cement replacement – 7 days compressive strength

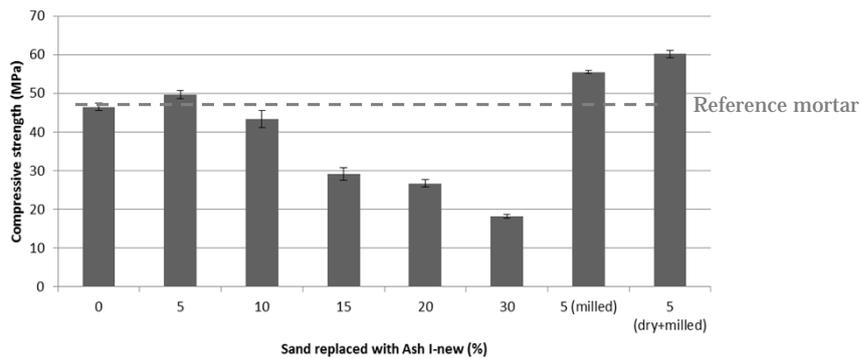


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## Upgrading secondary resources – simple processes

### Example sewage sludge ash in concrete – ash as received and grinded

(2) Sand replacement – 7 days compressive strength

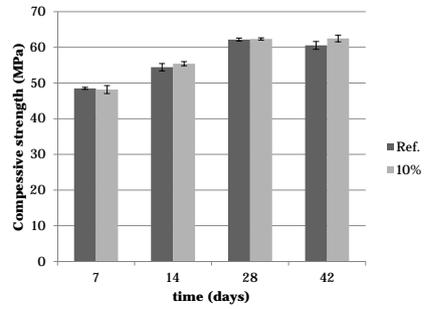


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## Upgrading secondary resources – detoxification

### Fly ash from municipal solid waste incineration

- Fine grained
- High content of heavy metals
- High content of soluble salts (incl. chlorides and sulphates)



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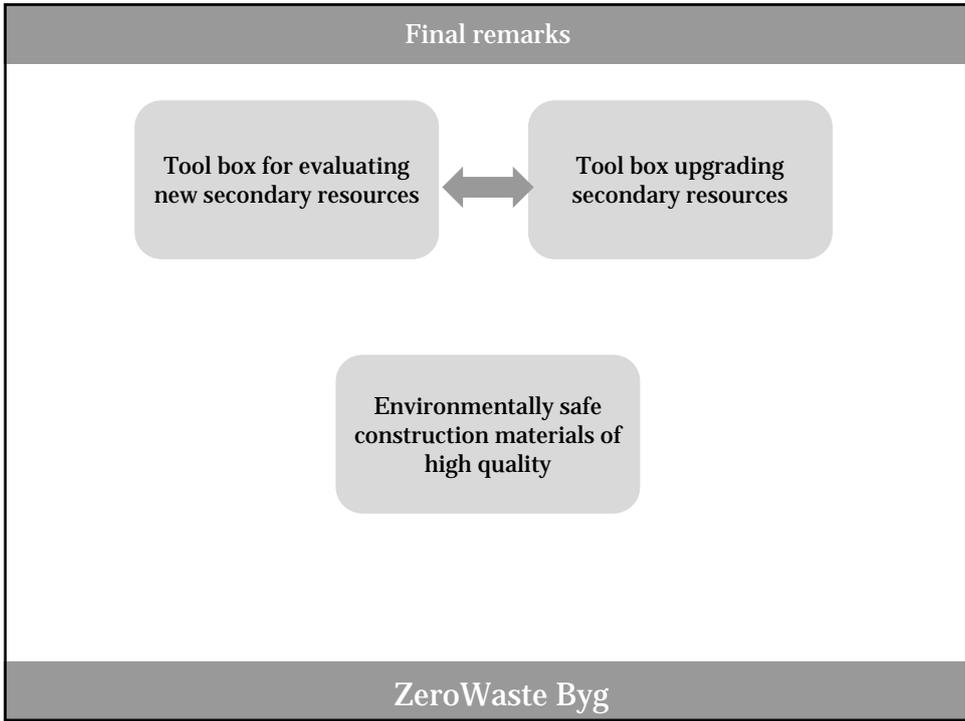
## Upgrading secondary resources – not always necessary

### Co-combustion wood and straw

- Low content of heavy metals
- Mortar sample without cement →



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<h2 style="margin: 0;">ZeroWaste Byg</h2> <p style="margin: 0;">Redesigning construction materials towards zero waste society</p>						
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