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# Tar Sampling

## Comparison of SPA, BTX and DIN CEN/TS 15439 analysis

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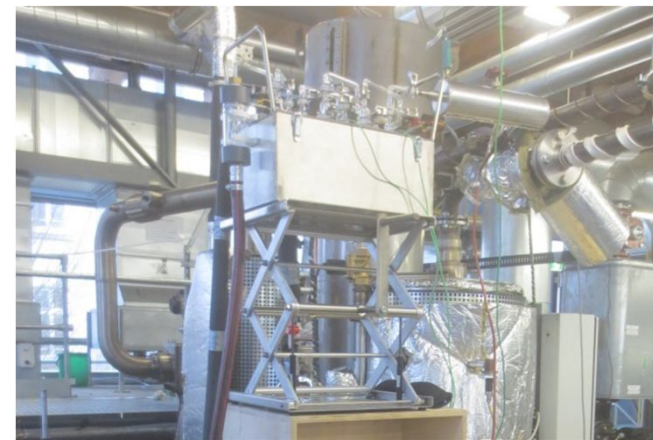
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# Scope

- Comparison of three different sampling methods:
  - DIN CEN/TS 15439
  - SPA
  - BTX
- Identifying the influence of
  - different sampling ports
  - different sampling operators and
  - different sampling set-up
- Creating a best practice manual for the sampling procedure and the sampling set-up



Scope

Pilot Plant

Methodology

Results

Conclusion

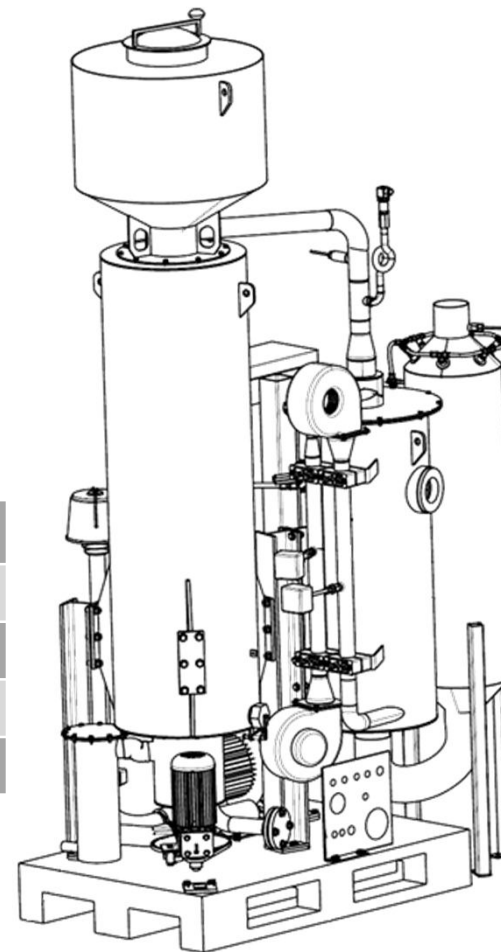
# Pilot Plant



- auto thermal, atmospheric air gasification with counter-current gasifier
- Biomass: wood chips

## Technical data

gasifier		Combustion chamber	
$dQ_{FWL}/dt$	33,6 kW	$dQ_{FWL}/dt$	22,2 kW
sv	0,34 m/s	$T_{ad,n,dry}$	1073 °C
$\lambda$	0,23	$\lambda$	1,9
$T_{outlet}$	70 °C	$T_{outlet}$	606 °C



Scope

Pilot Plant

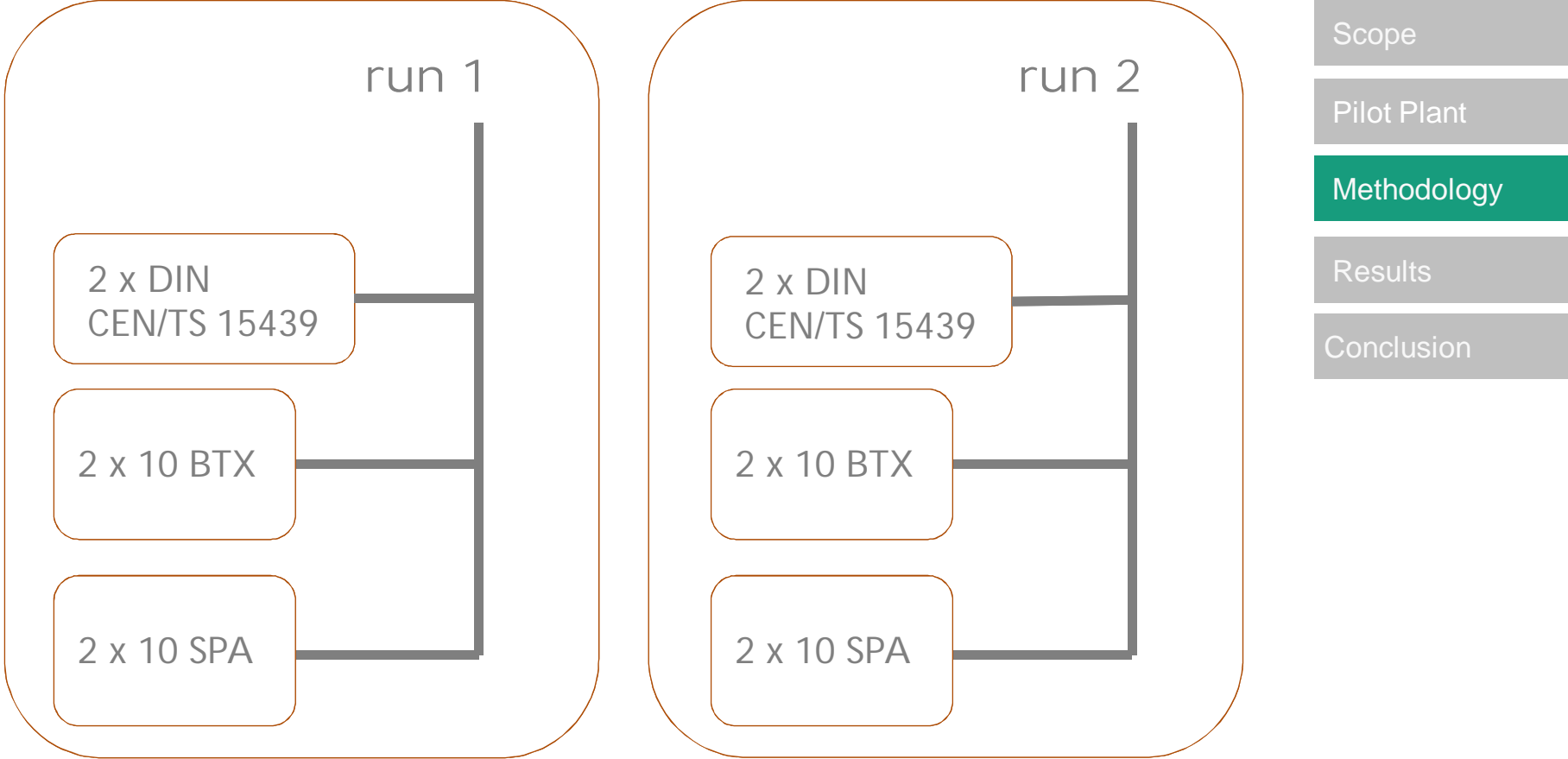
Methodology

Results

Conclusion

# Methodology

## synchronous tar sampling with different sampling methods



# Methodology

## SPA / BTX analysis

1. Purging of SPA column with a mixture of isopropanol and acetonitrile
2. Adsorption of gaseous tar components on a solid phase
  - BTX: activated carbon (coconut)
  - SPA: Chromabond C18ec
3. Elution of the sampling pipe
  - Solvent BTX: CS<sub>2</sub>
  - Solvent SPA: mixture of isopropanol / acetonitrile
  - Add-on of 30micro-g TBCH (SPA, BTX) / o-Terphenyle (SPA) as internal standard
4. GC analysis (one run for phenols and aromatic hydrocarbons)

Scope

Pilot Plant

Methodology

First results

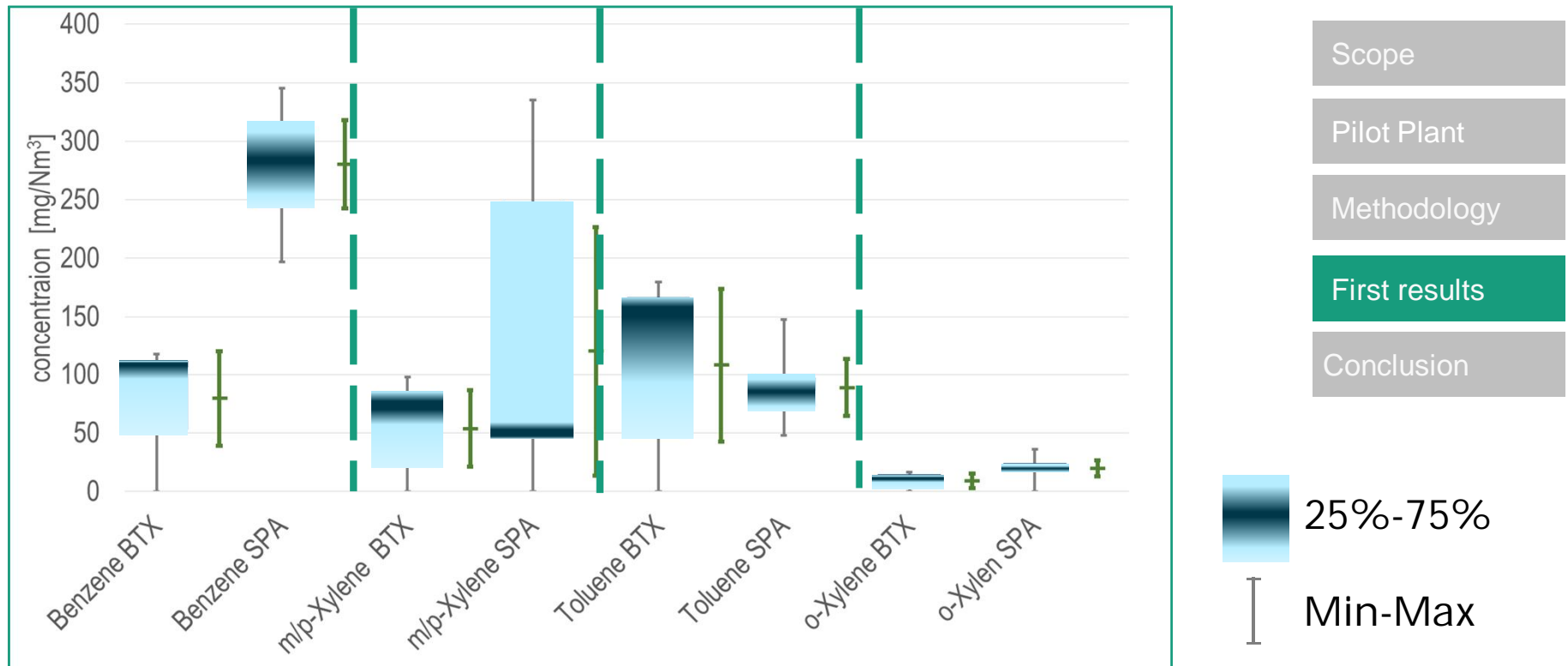
Conclusion



Reference: Baumhagl, C.: *Substitute Natural Gas Production with direct Conversion of Higher Hydrocarbons*, Dissertation, FAU, 2014

# First results

## Comparison of SPA and BTX analysis



A higher amount of benzene was identified via SPA analysis in comparison to BTX analysis.

# Conclusion

- Quantitative results regarding BTX, SPA and DIN CEN/TS 15439 analysis are within the same range.
- Certain failure sources during for tar sampling with SPA and BTX method could be identified.
- Some effects concerning differences in the sampling methods have to be considered in detail again, to learn more.
- Outlook:
  - Best practice manual for tar sampling with SPA method is in progress.
  - Improvements of the tar sampling equipment will be tested in a next step.

Scope

Pilot Plant

Methodology

First results

Conclusion



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# Thank you for your attention!



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