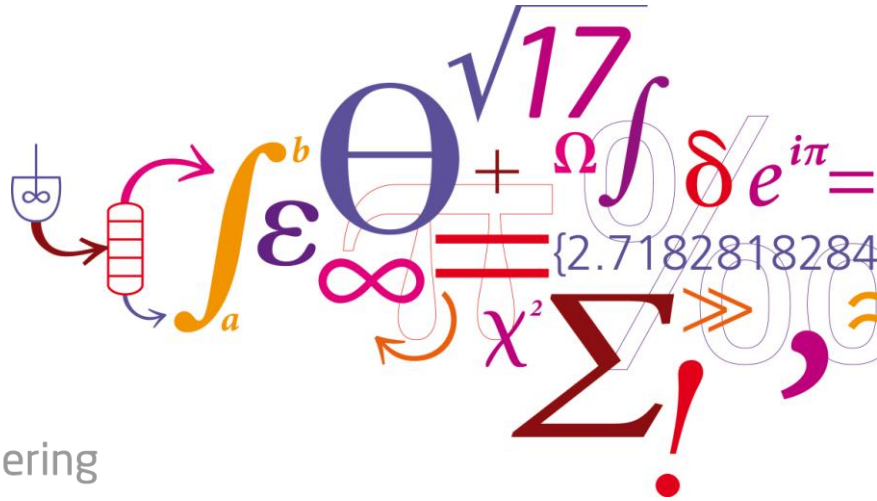
WP5 Status Presentation

Delft, The Netherlands, April, 2015

Flemming J. Frandsen

Asc. Prof., Dr. Techn., Ph.D., M.Sc.



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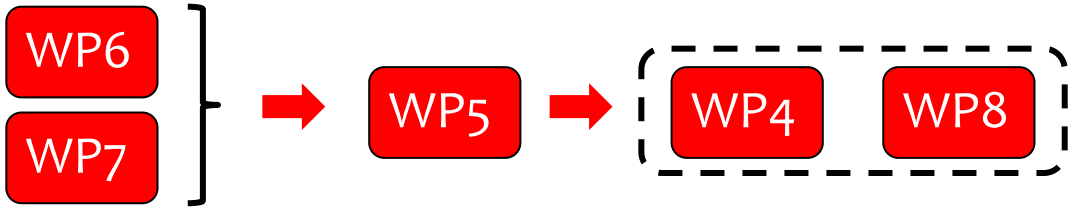
BRISK WP5 Content:

- Task 5.1 Protocols (DTU)
  - Manuals + guidelines
- Task 5.2 Database (DTU)
  - Survey of existing databases
  - Collection of data generated in BRISK
- Task 5.3 Benchmarking of Experimental Rigs (TUD)



BRISK WP-5 Database Inquiry:

1. Do you have one or more in-house databases containing fuel data ?
2. What data are contained in the database (proximate analyses, ultimate analyses, bulk ash chemistry, ash fushion temperatures etc.):
   – Please provide a short description of the format of the database.
3. What is the format of the database ?
   – ASCII, Access or another known structure etc.
4. Is the database publically available e.g. on www ?
   – In case yes, please provide an url-link for the database. If you have any other electronic documentation, say a publication of a public report, please provide a copy of this.
5. Are you familiar with other databases containing fuel data (outside the BRISK partner framework) ? Please, provide as much info as possible on this (links, references etc.)

Fuel Database Review Paper ?

BRISK WP-5 Database Review Paper: Dissemination

General Announcement and Call for Papers – 21st Meeting

Impacts of Fuel Quality on Power Production

October 26 – 31, 2014
Snowbird, Utah

This conference will highlight solutions to the significant fuel-quality challenges facing power producers utilizing current power technologies such as fluidized bed, sub-critical boilers, incineration as well as newer technologies such as IGCC, PFBC, super- and ultrasuper-critical boilers, oxy-fuel systems, etc. These challenges include fuel preparation and blending, slagging, fouling, corrosion, sooting, ash disposal, catalyst poisoning, availability and capacity increases, and improved sensors and controls. The conference emphasizes end-results and application of fundamental information to minimize fuel quality impacts in power production. The conference will focus on traditional fuels, particularly traded coals, low grade and low rank coals and opportunity fuels such as biomass, tires, black liquor, waste sludge and pet coke. Fundamental studies, pilot-scale investigations, full-scale evaluations and computer simulation papers are encouraged.

Sessions for the conference will include, but are not limited to, the following:

- Fuel Characterization
- Fuel Preparation and Upgrading
- Alternate Fuel/Coal Blending
- Combustion Performance
- Deposition Formation and Control
- Corrosion
- Gaseous/Particulate Emissions
- Diagnostics, Sensors, and Controls

Fuel Quality/Ash Deposition Conferences
The first deposition conference was held at the Marchwood Engineering Laboratories in the UK in 1963. Since that time 20 excellent conferences have been held to provide interchange, dialogue, experiences and results among those who deal with the many opportunities afforded by fuel quality. Over the past several years, the conference is held biennially and continues to focus on fuel characteristics and their paramount importance in power production. The format for this conference will follow past conference tradition, that is, morning and evening sessions in which major presentations are made and time during the afternoons for ad hoc meetings and informal discussions. The format is designed to enhance rapport among participants and promote dialogue; all participants are encouraged to contribute actively to the discussions.

Conference Location
Snowbird, Utah is located less than 45 minutes from the Salt lake City International Airport in the Wasatch Mountains. The main lodge and conference center are located at an altitude of 8,000 feet (2,440 meters) above sea level with a tram climbing to over 11,000 feet (3,350 meters) elevation. For more information, visit the Snowbird website (http://www.snowbird.com).

Paper for 'Impacts of Fuel Quality on Power Production' Conference, Snowbird, Utah, October 26-31, 2014:

High-Quality Fuel and Ash Databases:
How BRISK is Pushing toward a Standard on Fuel Data Storage

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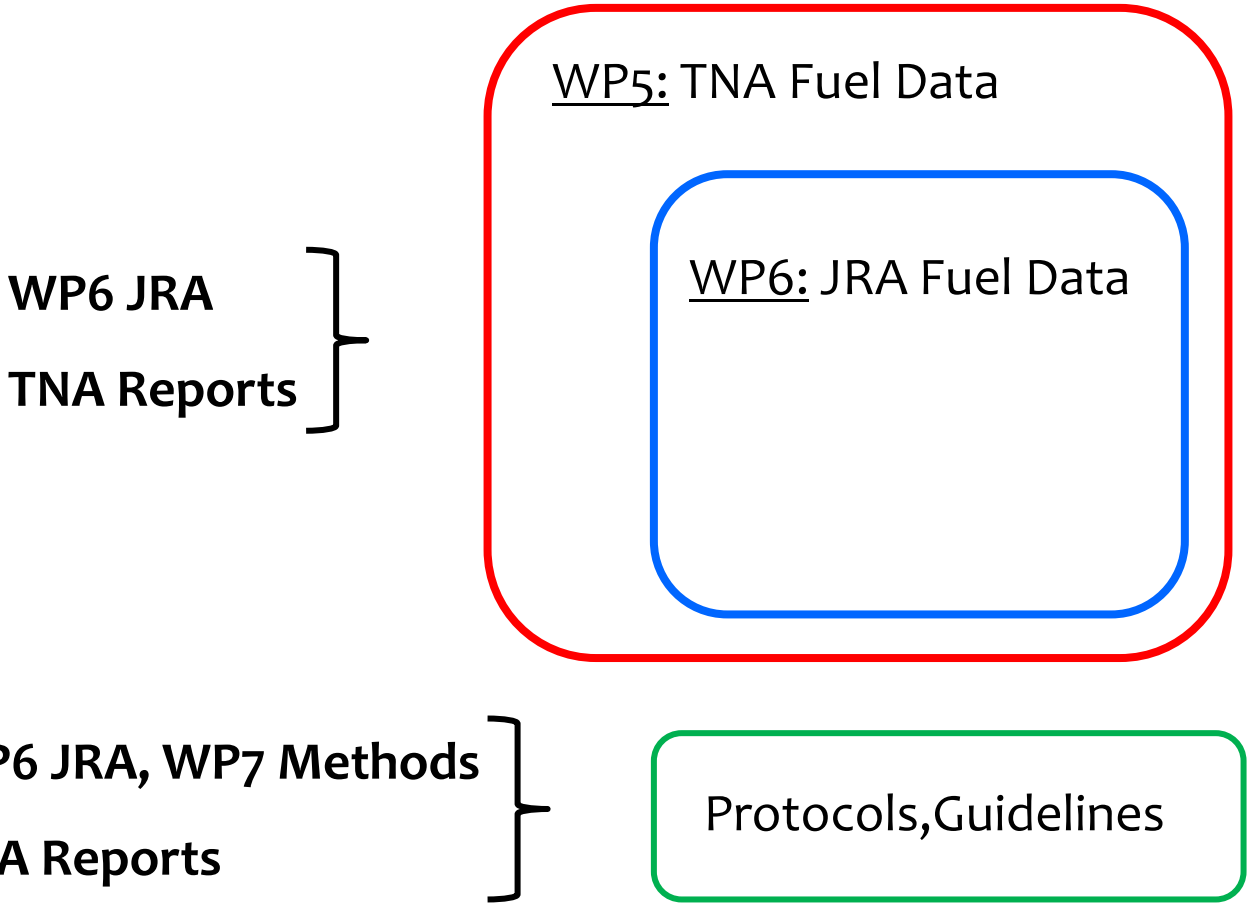
Abstract:

When reporting experimental data on thermal conversion of fuels, it is of utmost importance to provide detailed and high-quality data on the fuel composition, as well as the experimental conditions under which the experiments were performed. Such data are needed, in order to judge and evaluate the quality, and generality of the results, obtained.

Through the years, several reports, and peer view papers, on all kind of aspects of thermal conversion of fuels, from pre-treatment issues, via operational problems like deposit formation and corrosion, to solid fuel flame stability problems and emission problems in relation to different gaseous components (CO/CO_2, SO_x, NO_x, alkali metals, trace elements), as well as particulate matter (PM and aerosols), have been reported in the literature. But very often the quality of the fuel data, and the conditions under which the actual experiments were conducted, supplied in these documents, are of a very doubtful quality, which makes it difficult to evaluate the general nature of the observations made. The same story is true for several final reports coming out of European Union (EU) Research & Development-projects.

It was therefore decided to focus attention on these issues among others, via BRISK (Biofuels Research Infrastructure for Sharing Knowledge), which is an EU Framework Programme 7-funded research infrastructure, with the main activity to fund researchers, from any EU-country, to carry out research at test-rigs/facilities belonging to any of the partners within the project.

Database + Protocol Development:



TNA Report Review, April 2015:

- Several TNA reports have been scanned carefully for input on:
  - Fuel/catalyst/bed material compostions
  - Pretreatment and feeding of fuels
  - Conduction of experiments
  - Documentation of equipment
  - Analysis of samples
  - Data treatment and analysis
  - Documentation of results
  - Proper references for background: theory, set-ups, experimental outines etc.

TNA Reports Scanned Carefully:

1st Author:	Host:	Short Title of Project:	Pages:
Marin	Aston	Fast pyrolysis processing of rape straw	25
Xue	ECN	Gasification of torrefied Miscanthus	7
Jakubiak	TUD	Application of GC-FID with a hot sampling loop	14
Pineda	Aston	Catalytic pyrolysis of biomass using zeolite catalysts	6
Aksoy	ECN	Co-gasification of nutshell and lignite	4
Rauch	TUW	Investigations of cold flow model of FT slurry reactor	4
Pineda	CPERI/CERTH	Catalytic pyrolysis of biomass on bench and pilot scales using a novel cobalt catalyst	5
Romar	NTNU	Characterization of catalysts for FT synthesis from biomass derived syngas	8
Panopoulos	Aston	Mass and energy balance estimation of a fast pyrolysis unit	7
Wang	Åbo	Release of inorgnaic elements from biomass	4
Li	IFRF	Biomass devolatilization and char oxidation kenitics in IPFR	6
Parsland	TUD	Stean reforming tests of BaNi-hexaaluminate in a slip stream of gasification gas	3
Wylde	Aston	Impact of applied pretreatment on thermal conversion of woody biomass species	2
Lavinia	CPERI/CERTH	Micro-mesoporous Pt/ZSM-5 catalyst for the hydroisomerization of BTL-naphta	5
Pineda	CPERI/CERTH	Biomass catalytic pyrolysis of mesoporous ZSM-5 zeolites	5
Karlström	IFRF	Biomass char oxidation kinetics in IPFR	6
Biollaz	TUD	Sulphur measurement round robin test at TUD	5
Herrmann	TUD	Study on impact of tars in SOFCs	6
Cortéz	KTH	Batch gasification of biomass and acid hydrolysis residues	12
Sacha	KTH	High-temperature air steam gasification of pretreated biomass pellets	13
Iskender	WUT, Poland	Thermal behavior of cellulose, hemicellulose and lignin	3

Future WP5 Activities:

- Protocol development (Task 5.1.):
  - How to report experimental work ?
  - How to report experimental data ?

ONGOING:

Initially based on WP6 + WP7 reporting

- Joint storage of data from experiments (Task 5.2.):
  - Fuel data [database format developed, to be tested against WP6 JRA activity data]
  - Experimental data [inspiration from WP6+7 and the UNIPI-Biomass Devo (BDDB) structure]
  - Storage of BRISK JRA and TA data

BRISK WP6 JR Activities:
Initial Protocols based on WP6 Activities

Task		single particle reactor	grid reactor	TGA	macro-TGA	bench scale gasification	fixed bed reactor	entrained flow reactor	BFB gasifier	updraft gasifier	combustion mode	gasification mode	inert atmosphere	>1000 K/min	100-1000 K/min	gas analyses	chemical analyses	decomposition beahviour	kinetics	N release	residue analyses	viscosity	atmoisation	thermal conversion characteristics	combustion behaviour	emissions / gas composition	ash formation	release of inorganics	deposit formation	char reactivity	change on PSD of ashes (coarse and fine)	gasification related performance parameters;	Liquids and wax analyses
6.1	BE2020				x						x	x	x		x	FTIR,	x	x		x	x					x		x					
6.1	AAU	x																	x											x			
6.1	WROC			x															x											x			
6.1	TUD			x															x											x			
6.1	TUD		x																x											x			
6.1	JRC-IE			x															x														
6.1	KTH				x														x														
6.1	ENEA			x															x											x			
6.2	BE2020																																
6.2	DTU																													x			
6.2	ECN																			x													
6.2	TUM																													x			
6.2	IFRF																		x	x										x			
6.2	ENEA			x																						x						x	
6.3	UNA						x						x		x																		x
6.3	TUBITAK								x																	x	x						x

Test facilities:

Single particle reactor

Grid reactor

TGAs

Fixed bed reactor

Entrained flow reactor

BFB gasifier

Updraft gasifier

Fuels tested:

Straw pellets

Wood pellets

Torrified pellets

Hydrolytic lignin

Pyrolyzed char

Sunflower cake

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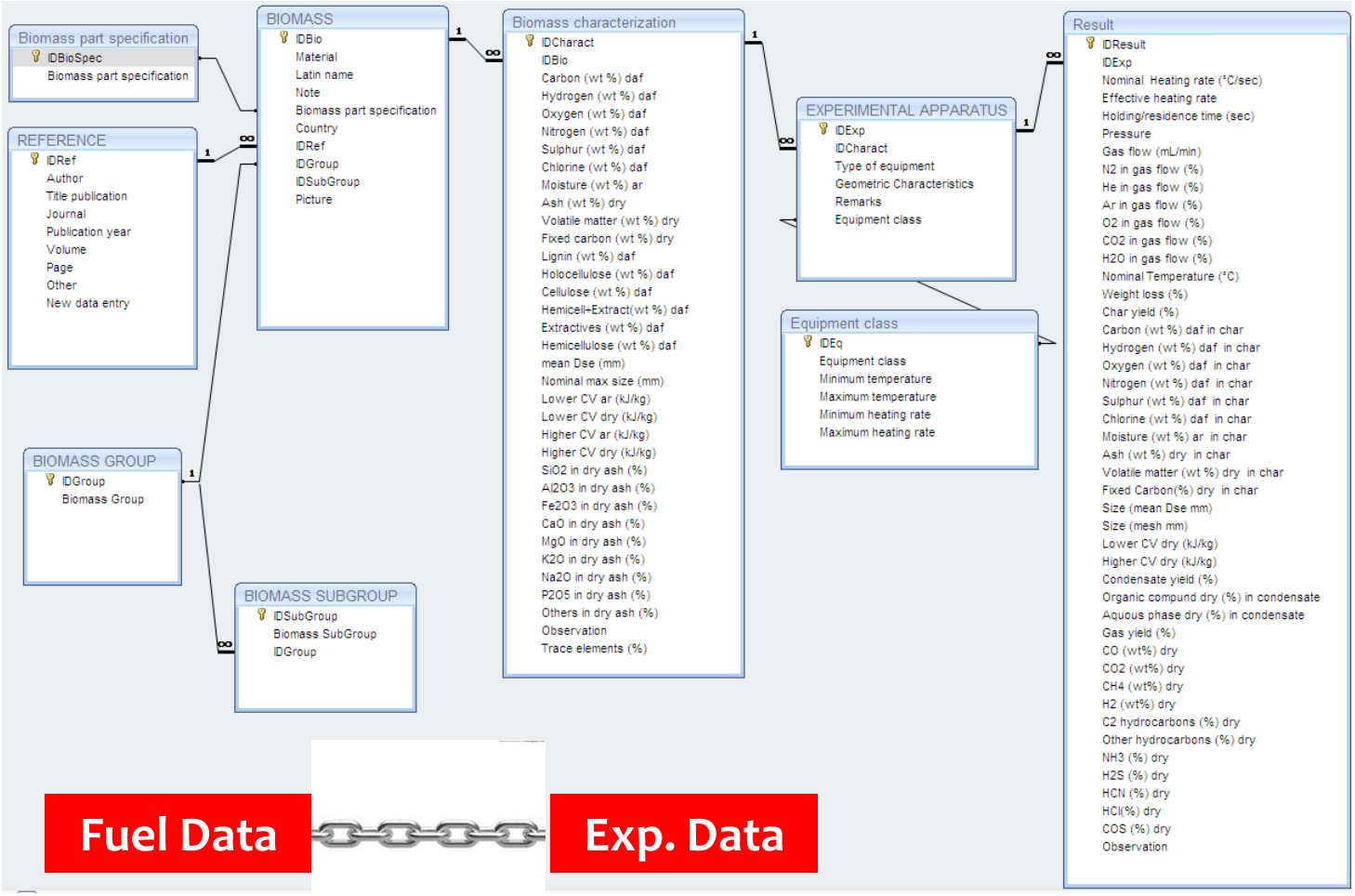
Future Activites:
Initial Protocols based on WP7 Activities

- Task 7.1
  - Particle sampling and analysis (Task leader: TUD)
- Task 7.2
  - Tar sampling and analysis (Task leader: KTH)
- Task 7.3
  - Gaseous sulphur species sampling and analysis (Task leader: PSI)
- Task 7.4
  - Improving gasification technology practices (Task leader: IFRF)

Joint Reporting/Storing of Data: UNIPI- Biomass Devo (BDDB)



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Thanks for the Attention

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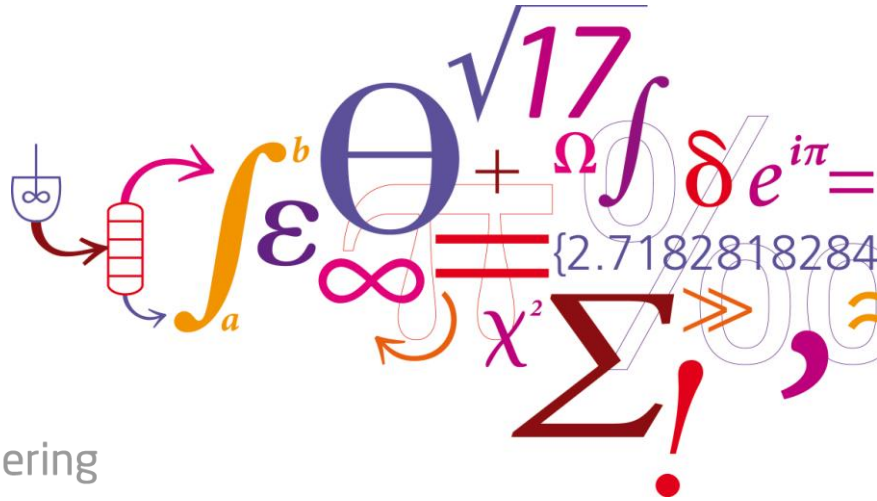

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