Unit of Biomass Technology and Chemistry, Umeå

Jan Burvall

Unit of Biomass Technology and Chemistry Umeå

- **Bioenergy, the whole chain from energycrop – heat water production**
- **Research on pellet production**
- **Characterisation of biomass focused on On-line technology e.g. NIR**

BioNorm – A project to support the ongoing standardisation process

"Pre-normative work on sampling and testing of solid biofuels for the development of quality assurance systems"

EU Political Targets

- Reduction of green house gases emissions by 8 %
- White paper on Renewable Sources of Energy
- Renewable Electricity Directive
- European Biofuel Directive

Measures to achieve targets

- Definition of acceptable standards for classification, sampling and testing of solid biofuels
- Development and implementation of QM systems for solid biofuels
- Elimination of trade barriers by harmonisation of the existing rules within Europe
- Development of a European market for solid biofuels

Aim of Bionorm

To carry out pre-normative work on solid biofuels in cooperation with CEN TC 335 “Solid Biofuels” in the field of:

- Sampling and sample reduction
- Physical and mechanical test methods
- Chemical tests
- QA systems
- Integration of new EU-member States (NMS) and newly Associated States (NAS)., respectively, in the standardisation process

Examples why BioNorm was needed for European standards

- CEN TC 335 Solid biofuels started in 1997
- Different methods for testing of solid biofuels were used within the European countries in many cases built on coal standards
- Round round robin tests showed a significant bias between some of them e.g the ash content and durability for pellets

Ash content

Temperature at 550 ˚C or 815 ˚C

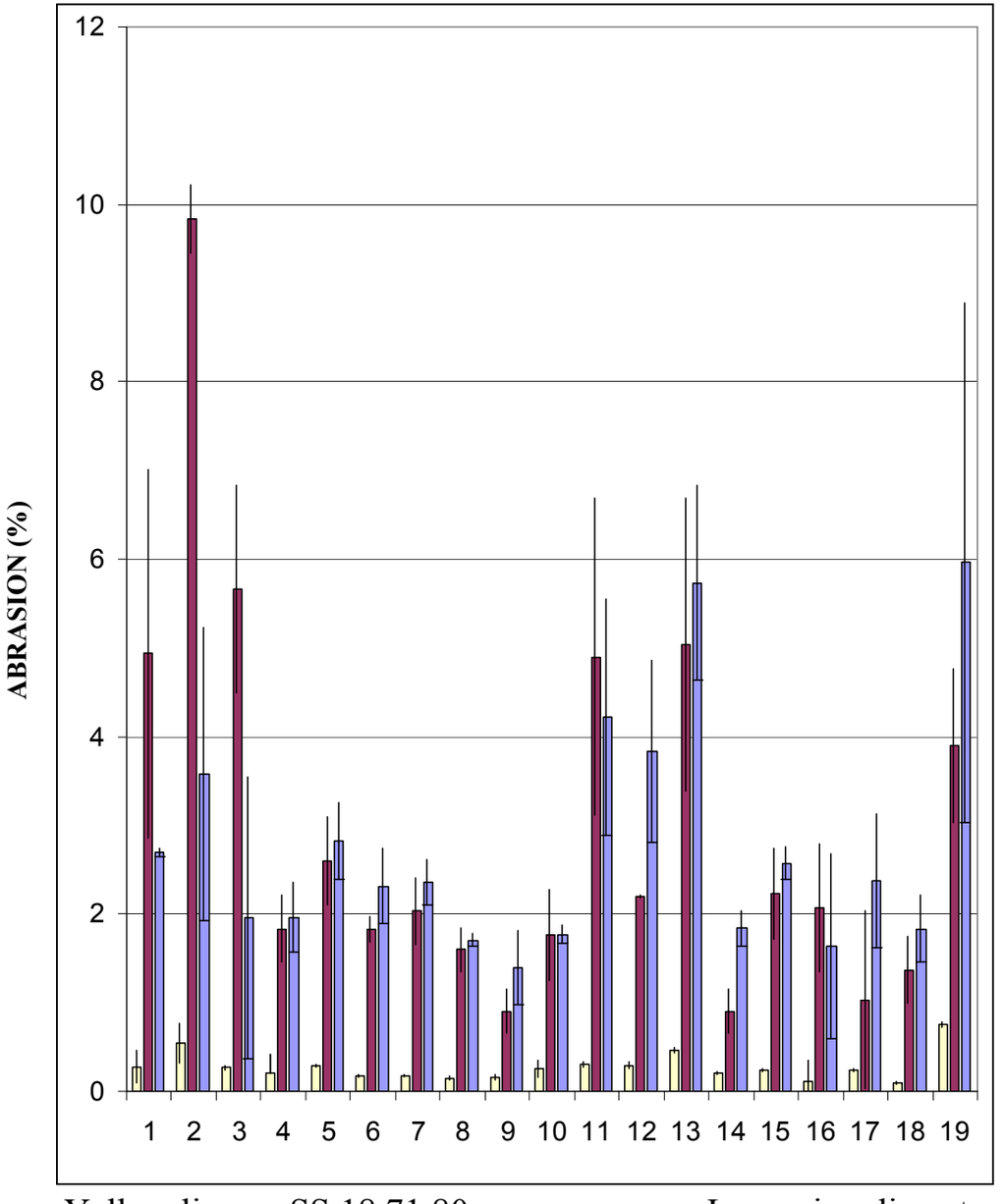
Durability -pellets

ASTM

SS

ÖNorm

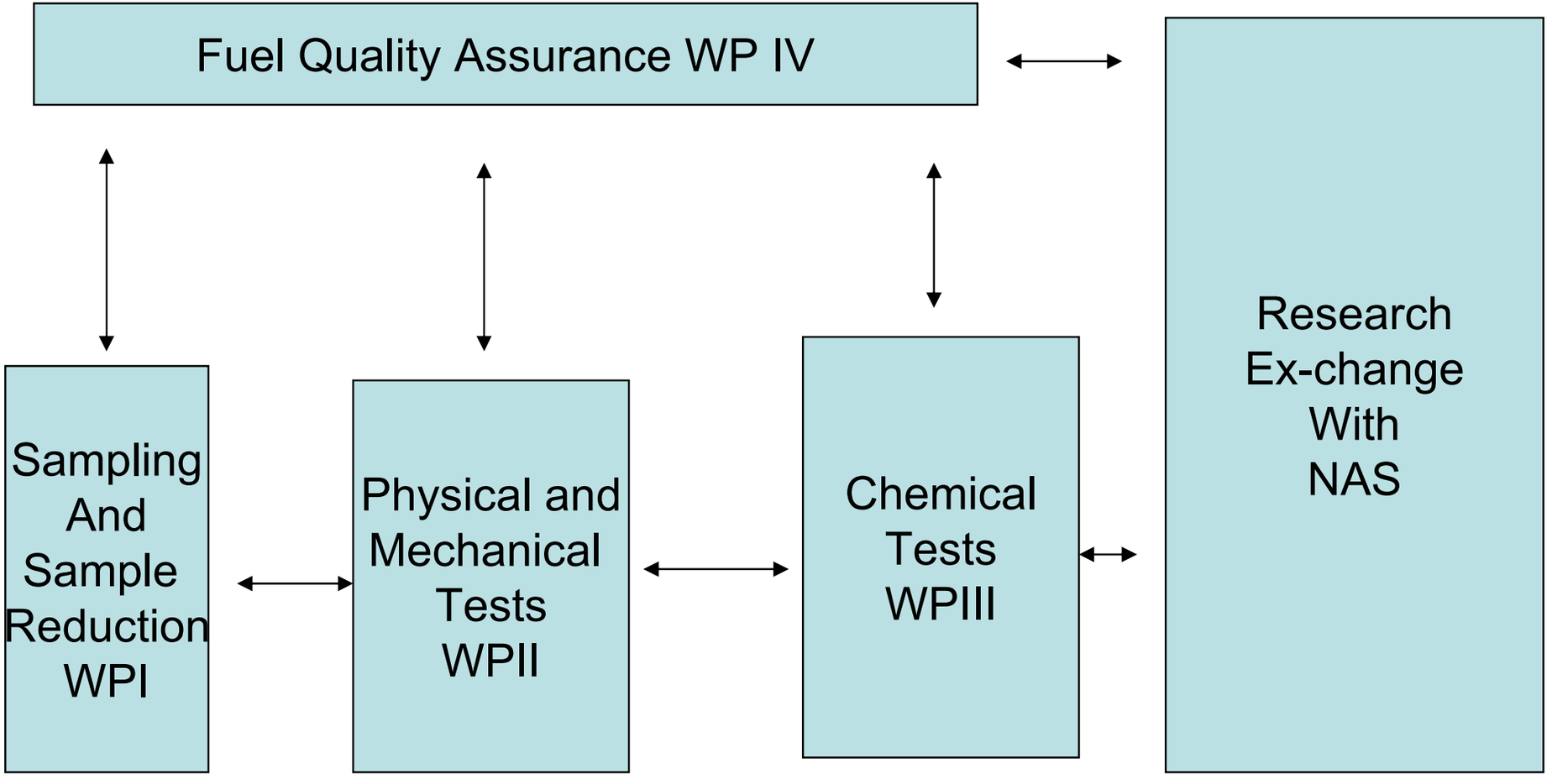
Durability - pellets



Yellow lines = SS 18 71 80
Red lines = Lignotester O60
Blue lines = ASAE 269.4

Increasing diameter

Bionorm Structure



Bionorm

Project co-ordination

IE Institute for Energy and Environmental GmbH, Leipzig, Germany

Prof. Dr.Ing. Martin Kaltschmitt

Overview Data

- Project runs from Jan 2002 to Dec 2004
- 33 partners from 14 European Countries and 16 sub contractors involved
- 6 partners from NMS/NAS are active in WP VI

(Bulgaria, Czech Republic, Latvia, Lithuania, Poland, Hungary)

- Total Budget: 5.7 Mio €
- EC contribution: 3.3 Mio €
- The project has been designed to support the of CEN TC 335 “Solid Biofuels”

European standards for Solid Biofuels CEN TC335

- Terminology
- Quality assurance
- Fuel specification and classes
- Sampling and sample reduction
- Physical methods
- Chemical methods

Today totally 28 Technical Specifications are published

Technical Specification and Standard – What is the difference ?

WP I
Sampling and Sample reduction

- Task I.1 Investigation of methods for sampling biofuels

- Task I.2 Investigation of methods for sample reduction of biofuels

WP II
Physical and Mechanical tests

- Task II.1 Moisture content and bulk density
- Task II.2 Ash melting behaviour
- Task II.3 Particle size distribution
- Task 11.4 Durability and raw density of pellets and briquettes

WP III

- Task III.1. Determination of sulphur, chlorine and nitrogen
- Task III.2 Determination of major and minor elements

Sampling -Biofuels

- Sampling
- Sampling from lorries
- Sampling plan and certificates

Biofuels – Sample preparation








Moisture content

- Reference method
- Simplified procedure
- General analysis sample

Fig 9. Picture of the drying equipment in the "GC-MS"-method.

Fig 10. The flow meter, the water trap and the cotamination trap together with the heating mantle.

Fig 11. The sample container and the pre-heating cupper tubing inside the oven.

Fig 12. The collection system with cooler, glass flask, carbon tubes and water trap.

Fig 13. The GC-MS instrument

Losses of VOC when drying at 105 °C

Calorific value for VOC in biomass

	kJ/g
α – pinene	45.2
β – pinene	45.0
Carene	39.0

Biomass material	**VOC as % of dry matter**
Birch bark	0,30
Birch chips	0,04
Cork	0,05
Eucalyptus	0,03
Hard wood	0,004
Logging residues	0,08
Milled peat	0,20
Miscantus	0,20
Olive stones	0,06
Pine bark	0,15
Pine chips	0,06
Pitchy wood	1,74
Rape cakes	0,04
Salix	0,02
Sawdust	0,05
Spruce bark	0,28
Spruce chips	0,04
Triticale	0,01
Wood pellets	0,09
Wood pellets II	0,10

BioNorm II obtained 26 of 30 points in the evaluation and is on a special list with other promising proposals which will be preferred when further resources are available.

- Instrumental methods for rapid tests and

On-line measurements

- Developing of methods for Bridging properties, impurities and particle size distribution
- Validation of the classification system of biofuels by handling and combustion tests
- Sampling and sample reduction of biomass from southern Europe

Summary

- BioNorm has developed improved sampling and testing procedures and assessed the limitations of existing procedures in detail.
- The quality assurance system developed in BioNorm allows for biofuel provision of quality according to customer demands
- The integration of the NMS/NAS into the work of BioNorm ensures that the standardisation requirements of these countries are considered.
- Due to the close link to the work of CEN TC 335 “Solid Biofuels”, an excellent exploitation of the results is guaranteed.
- BioNorm has contributed significantly to the development of highly sophisticated standards.

Thanks for your attention !