Paul Lucchese/
Bert Rietveld
Coordinator SOFCNET
ECN

SOFCNET

- Thematic Network on Solid Oxide Fuel Cell Technology

- Objectives

  ❑ Create a European network, involving all major organizations, that assists and stimulates exchange and collaboration on SOFC research and technological development.

  ❑ Accelerate commercial introduction of SOFC based systems for efficient and environmentally clean co-generation of power and heat.

- Duration Jan 1, 2003 - Dec 31, 2005

- FP5 – Energy, Environment and Sustainable Development

- Reference ENG2-CT-2002-20652

46 Participants

Adelan (UK)

H.C.Starck (D)

Siemens (D)

Univ StAndrews (UK)

Alstom (UK)

EMPA (CH)

ICE-HTFORTH (GR)

StwDüssel (D)

Univ Twente (NL)

BMW (D)

EnBW (D)

ICSTM (UK)

Sulzer Innotec (CH)

Valeo CC (F)

Univ Patras

Shell H (NL)

CEA (F)

ENEA (I)

IFP (F)

Tractebel (B)

VDI (D)

CIEMAT (SP)

EPFL (CH)

Intema (A)

TUM (D)

VTT (FIN)

CReeD (F)

EVA (A)

Prototech (NO)

Univ Sherbrook (CA)
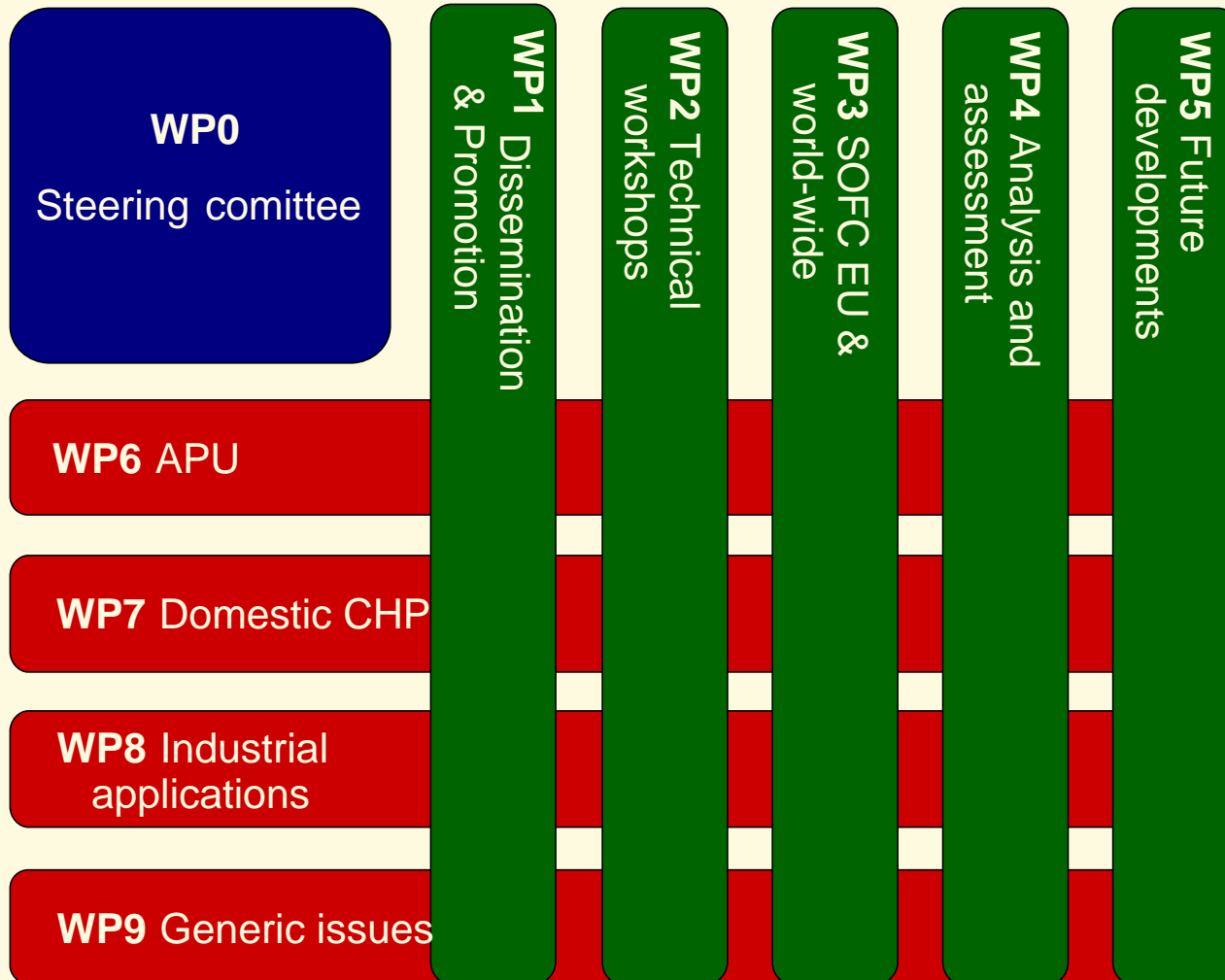
Wärtsilä (FIN)

Delphi (L)

FHG-IKTS (D)

RNL (DK)

UASHH (D)

Webasto (D)

DLR (D)

FZJ (D)

Rolls Royce (UK)

Univ Aveiro (P)

ECN (NL)

GDF (F)

RWE FC (D)

Univ Karlsruhe (D)

EDF (F)

GDR-ITSOFC (F)

46 Participants

Structure

SOFC_NET_

WP0

Steering comitee

WP1 Dissemination & Promotion

WP2 Technical workshops

WP3 SOFC EU & world-wide

WP4 Analysis and assessment

WP5 Future developments

WP6 APU

WP7 Domestic CHP

WP8 Industrial applications

WP9 Generic issues

Responsibilities & Activities (1)

- WP0: Steering committee
  - Energy research Centre of the Netherlands (ECN)

- WP1: Dissemination and Promotion
  - Intema Consult
  - Informing the SOFC community, and dissemination of the network results by **web site**

- WP2: Technical Workshops
  - Risoe National Laboratory
  - Organisation of 6 workshops addressing critical technical issues for reducing costs and improving reliability of SOFC based systems

- WP3: SOFC world-wide
  - Forschungszentrum Juelich (FZJ)
  - Mapping and documentation of worldwide SOFC activities and promoting collaboration between SOFCNET and other networks.

Responsibilities & Activities (2)

- WP4: Analysis and Assessment
  - Centre Energie d'Atomique (CEA)
  - Inventory of industrial performance requirements; specification of benchmarks for SOFC performance; definition of test conditions (close collaboration with FCTestNet)

- WP5: Future Developments
  - Verein Deutscher Ingenieure (VDI)
  - Assisting / advising participants and the EC on relevant future R&D needs. Identification of barriers / opportunities from legislation and regulation.

- WP6: APU
  - Deutsche Luft und Raumfahrt (DLR)
  - Collect, identify, evaluate technical and non-technical issues relevant for the introduction of APU in transport applications.

Responsbilities & Activities (3)

- WP7: Domestic CHP
  - Sulzer Innotec
  - Collect, identify, evaluate technical and non-technical issues relevant for the introduction of residential CHP systems in society.

- WP8: Industrial Applications
  - Tractebel Energy Engineering (TEE)
  - Collect, identify, evaluate technical and non-technical issues relevant for the introduction of industrial and commercial CHP systems in society.

- WP9: Generic Issues
  - Imperial College
  - Analysis of development requirements and state of the art, irrespective of the field of application.

WP0: Steering Committee
Bert Rietveld, ECN

- Overall implementation and coordination of the network

- Regular contact to the EC

- Contractual and financial administartion

- Chairing the steering committee (consisting of all WP managers)

- Organisation of 'clustered' meetings

WP1: Dissemination & Promotion
Herbert Wancura, Intema Consult

- SOFCnet website

- Public area: general SOFC info, public reports, news, announcements, presentations, etc

- Member area: internal working zone, contracts, (draft) reports, etc

- Optional: mini-disc, brochure

WP2: Technical workshops
Mogens Mogensen, Risoe

Workshops

1. Operational demands to SOFC systems (ECN - March 20, 2003)

2. Fuel processing and stability of anodes (VTT - September 9, 2003)

3. Possibilities of better SOFC R&D task sharing in Europe (VDI - March 3, 2004)

4. Modelling and Engineering of SOFC cells, stacks and systems (CNRS - September, 2004)

5. Materials, processes and degradation mechanisms in SOFC cells, stacks and systems (USTAN, March 2005)

6. Technical barriers to potential SOFC applications (Risoe, September 2005)

7. Possibly: Workshop APU
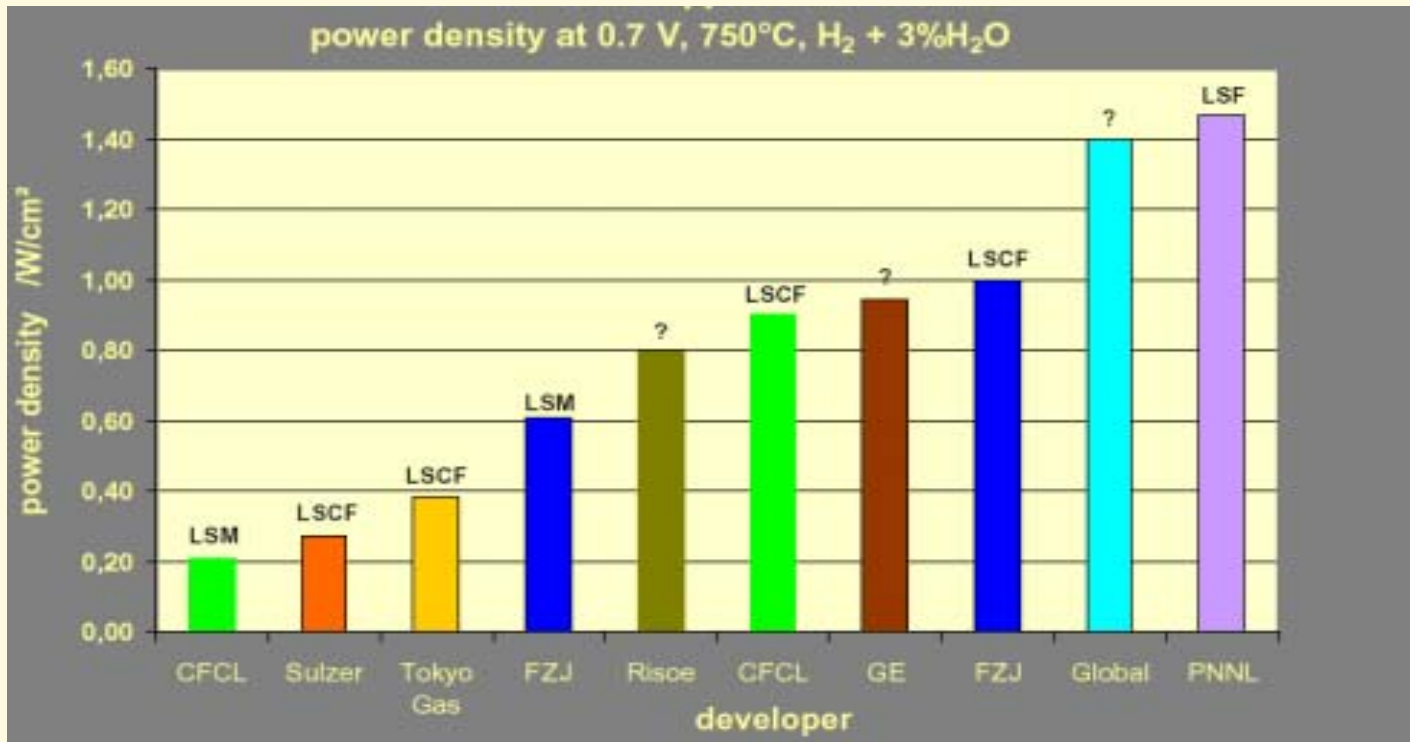
WP3: SOFC worldwide
Heinz Nabielek, FZJ

- Mapping of SOFC activities worldwide

  - questionnaire EU and abroad

- Reporting on SOFC relevant conferences

- Linking with EU networks HYNET, ELEDRIVE and FHIRST

- Linking with IEA Annex SOFC

- Linking with networks in the US, Japan and Australia
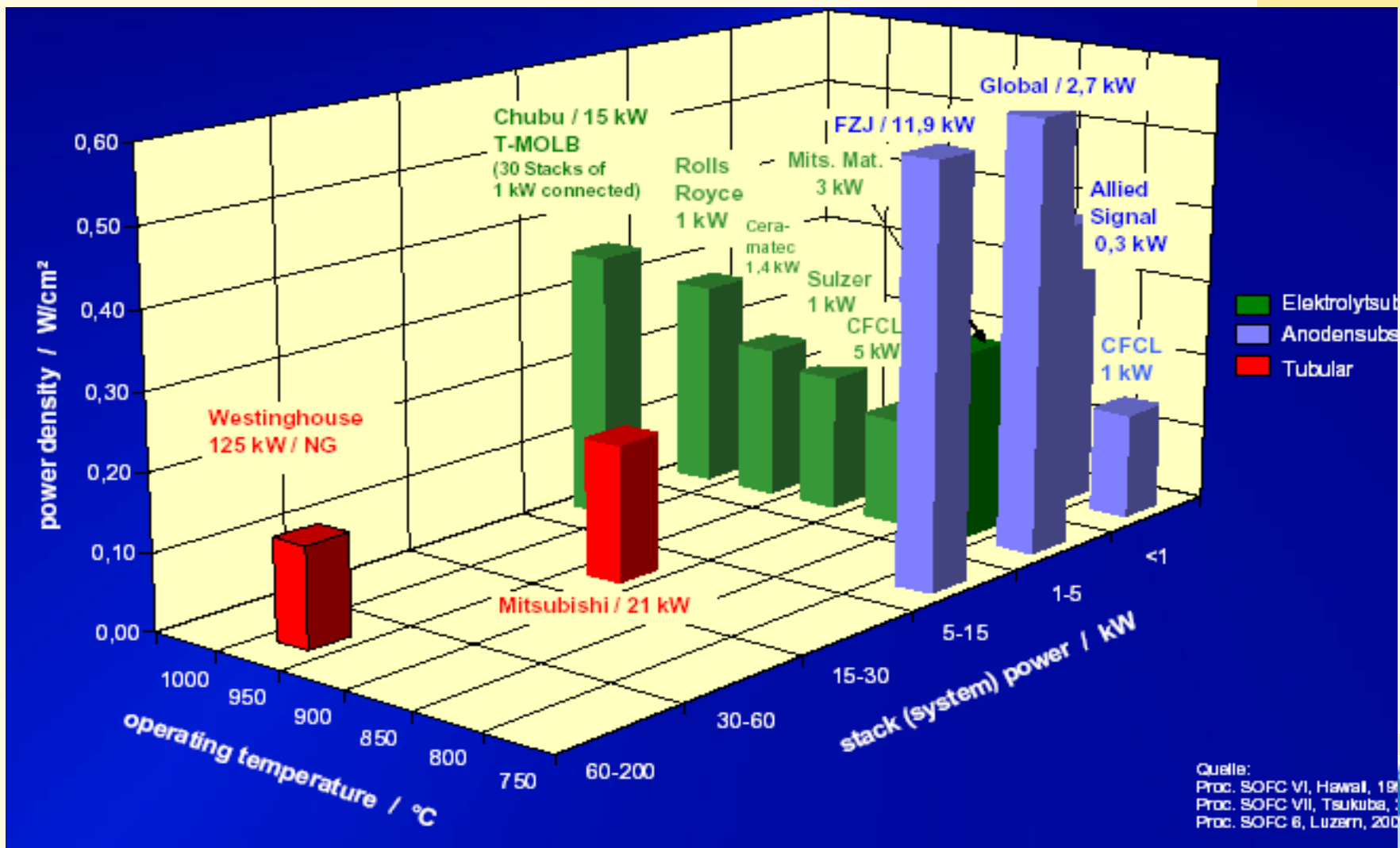
WP3: SOFC worldwide
Heinz Nabielek, FZJ

power density at 0.7 V, 750°C, H_2 + 3%H_2O

With planar thin electrolyte/ anode supported cells, values between 0.2 to 1.5 W/cm^2 power density have been reached by the various developers.
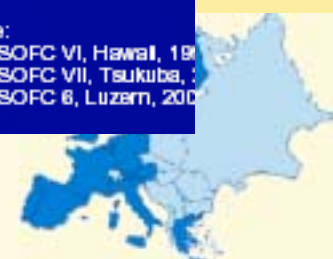
(From H. Nabielek FZJ)

(From H. Nabielek FZJ)

WP4: Analysis & Assessment
Florence Lefebvre-Joud, CEA

Propose a common methodology for the assessment of reported results on their relevance for industrial targets

- Collection of industrial customer needs
- Collection of reported performance data
- Definition of evaluation tool for assessing the relevance of test data
- Review and assessment and the data by applying the tool
- Harmonization test conditions (FCTESTnet)
- Specification of bench marks, including references
- Recommendations to SOFC developers

✓ Realisation of a technical questionnaire
✓ Analysis → state of the art performances and targets according to the application

WP5: Future developments
Wolfgang Winkler, VDI

- **Advice the EC on future calls that accelerate SOFC development / deployment**

  - Assessment of the relevance for the progress of SOFC development of EC projects over the last ten years

  - Analysis of the current situation

  - Recommendations for future calls

- **Advice SOFC developers on standardization issues**

  - Analysis of the role of standardisation in cost reduction and rate of market penetration

  - Identification of possible synergies between applications/markets

  - Recommendations for SOFC developers

WP6: APU
Rudi Henne, DLR

- **Identification of technical and non-technical issues relevant for the introduction of APU in transport applications**

  - Collection of information from producers, servicing organisations, customers and legislative organisations on APU requirements

  - Identification of technical, economical, market, political barriers for the introduction of SOFC based APU systems.

  - Recommendations for future developments, technological interactions and demonstration projects

  - Trucks, passenger cars, trains, ships, aircraft

WP7: Domestic CHP
Gilles Robert, Sulzer Innotec

- **Identification of technical and non-technical issues relevant for the introduction of domestic CHP**

  - Collection of information from producers, servicing organisations, customers and legislative organisations on APU requirements

  - Identification of technical, economical, market, political barriers for the introduction of SOFC based APU systems.

  - Recommendations for future developments, technological interactions and demonstration projects

WP8: Industrial applications
Elie Stubbe, Tractebel EE

- **Identification of technical and non-technical issues relevant for the introduction of industrial CHP**

    - Collection of information from producers, servicing organisations, customers and legislative organisations on APU requirements

    - Identification of technical, economical, market, political barriers for the introduction of SOFC based APU systems.

    - Recommendations for future developments, technological interactions and demonstration projects

WP9: Generic Issues
Alan Atkinson, Imperial College

- **Analysis of development requirements and state of the art that are irrespective of the application**

  - Cathodes, anodes, electrolytes

  - Interconnects, coatings

  - Seals

  - Chemical synthesis

  - Fuel processing

  - Modelling

  - System integration

  - Cost reduction

✓Review papers on cathodes and electrolytes
Scheduled on: anodes, coatings, seals, fuel processing, modeling,

✓ **www.sofcnet.org**