MEYER WERFT
PAPENBURG 1795

e4ships
Brennstoffzellen im maritimen Einsatz
nip

Pa-X-ell
Modular Fuel Cell Systems as Decentralized Energy Supply Source for Passenger Ships

Final Zemships Conference

20th of April 2010

AIDA Cruises | Beluga Shipping | CMT – Center of Maritime Technologies | DNV Germany | Elsflether Zentrum für Maritime Forschung | EVT – Gesellschaft für Energieverfahrenstechnik | Flensburger Schiffbau-Gesellschaft | Fr. Lürssen Werft | Germanischer Lloyd | hySOLUTIONS | HAW Hamburg | Helmut-Schmidt Universität | Imtech Marine Germany | INVEN Engineering | MEYER WERFT | MTU Onsite Energy | Proton Motor | Reederei Rörd Braren | ThyssenKrupp Marine Systems | Verband für Schiffbau und Meerestechnik | ZBT Zentrum für BrennstoffzellenTechnik

E4ships Structure

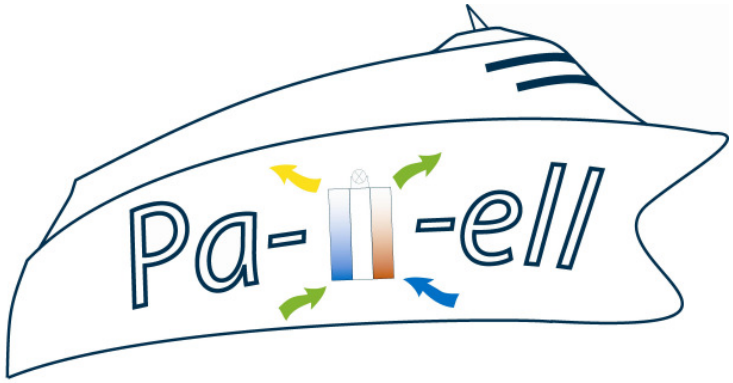
Synergy Module „**Toplaterne**“

AP Technology	AP Management	AP Safety

Demonstration Modules

PaXell (MW,FL,FSG) Passager Ship	**SchIBZ** (TKMS) Yacht, Spec.Ship	
• R and D, Marinizing • Comb. cycl. with MCFC • Decentralisation • Demonstration	• R and D, Marinizing • XTL-Diesel • Demonstration	

„Pa-X-ell“

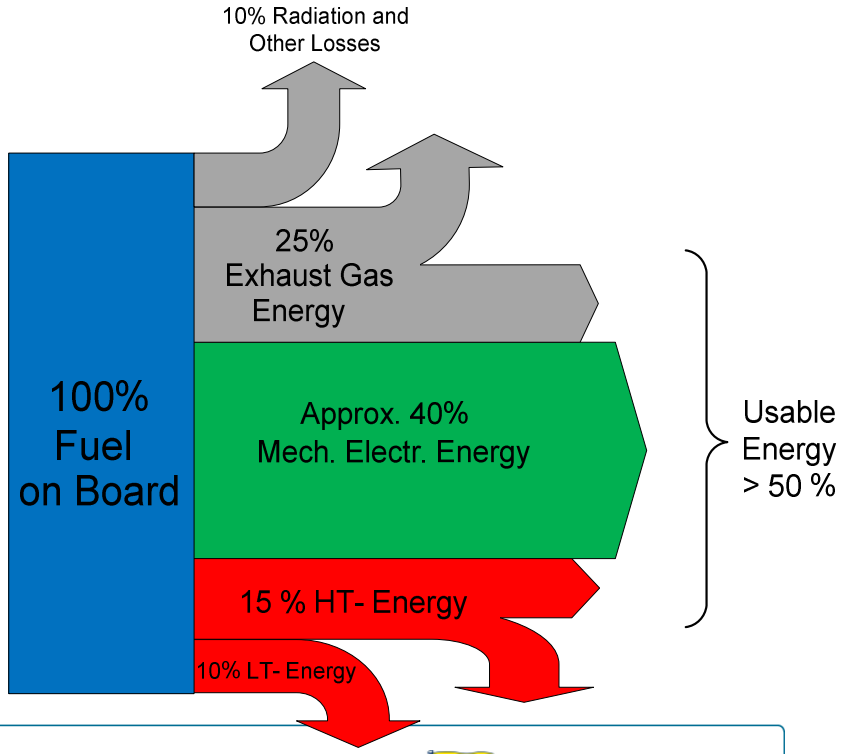


Strategy

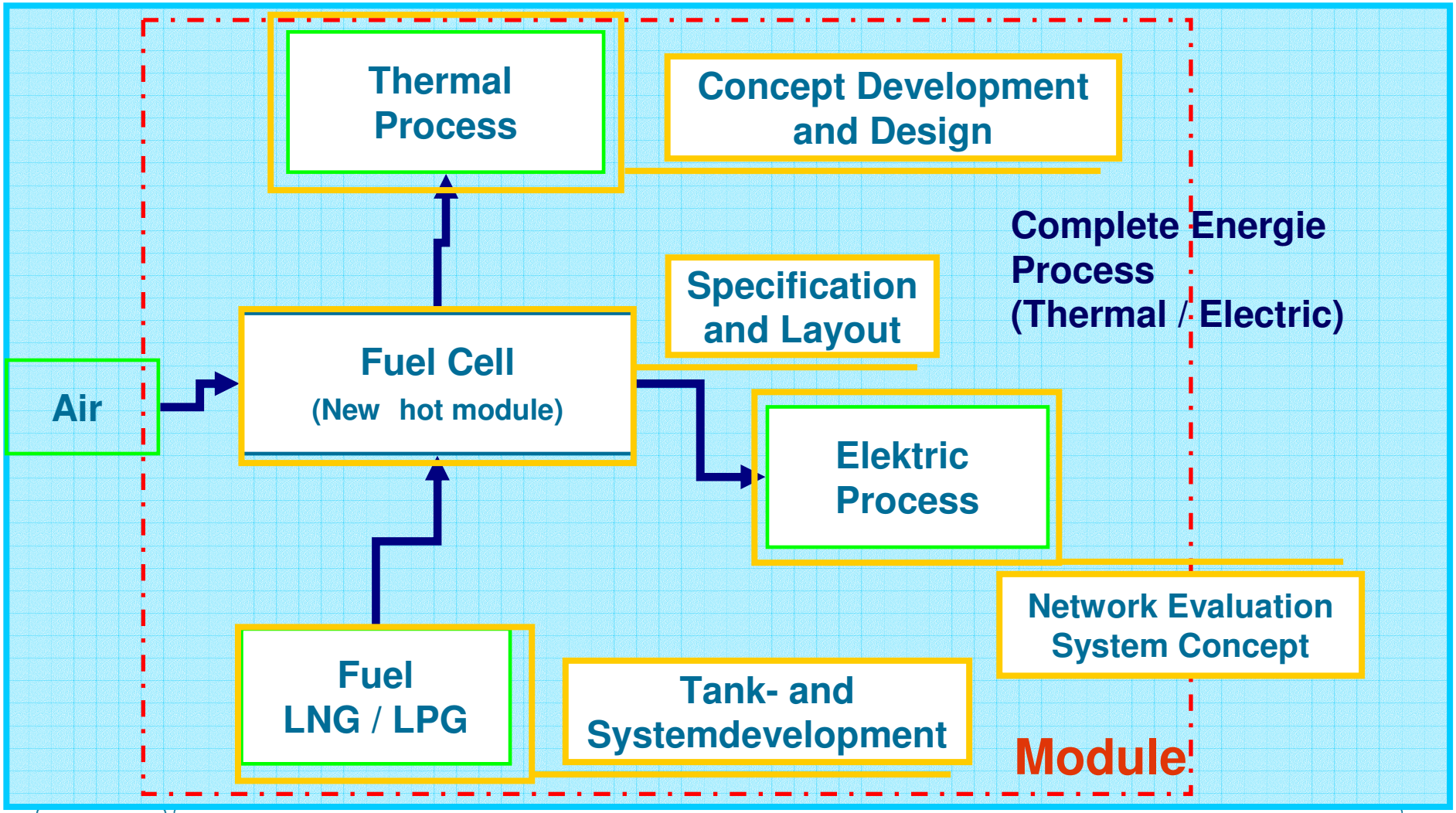
- Design of new Energy concepts for Ships
- Passanger ships / Yachts / RoRo-Pax
- Special Application / Sailing Areas
  - sensitive Areas
  - Berthing in Urban Areas
  - IMO (Tier II und III)
  - ECA
  - Noneviuable Exhaust
  - Noise
- Alternative to Classic Fuells
  - Enviroment friendly fuells
  - LNG, LPG, Methanol, Ethanol
  - Gaspax

Strategy

- Design of Complete
  Elec. / Mech./ Therm. Energy Concepts
- Increase Ships Energy Efficiency
- Emissions
  - Emissions to Air
  - Emissions to Water
  - Noise Emission
- Decentralization
  - Low Energy Flow in Systems
  - High Redunacy
  - SRtP
  - Safety

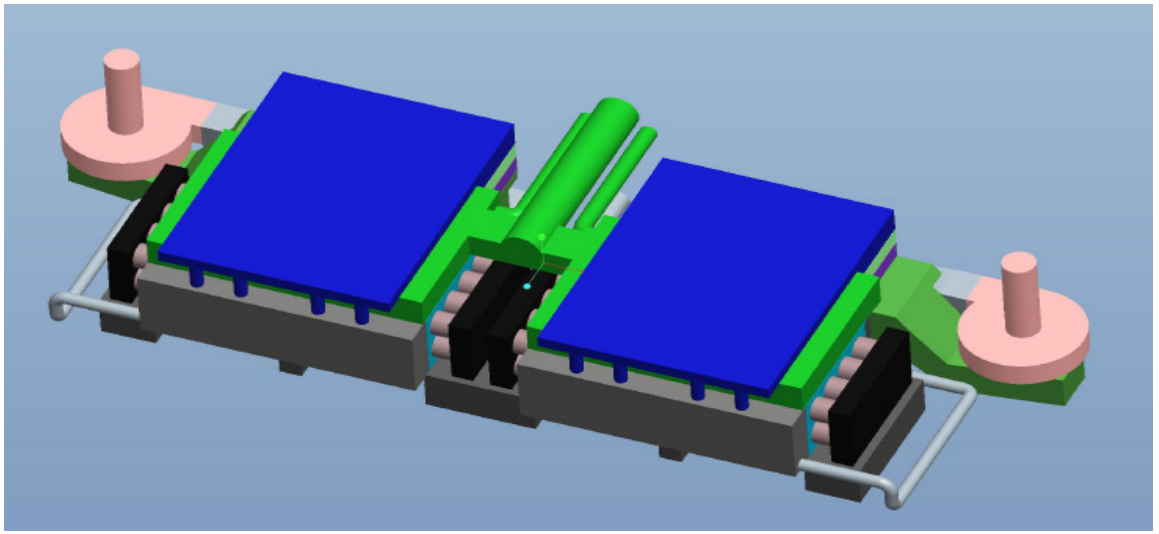


The Energy Module



The new Hot Module

- Concept Development Hot module



Stack Design
Module Design
Specification

The Fuel

- Fuel Evaluation and definition

- LNG
- LPG
- Methanol

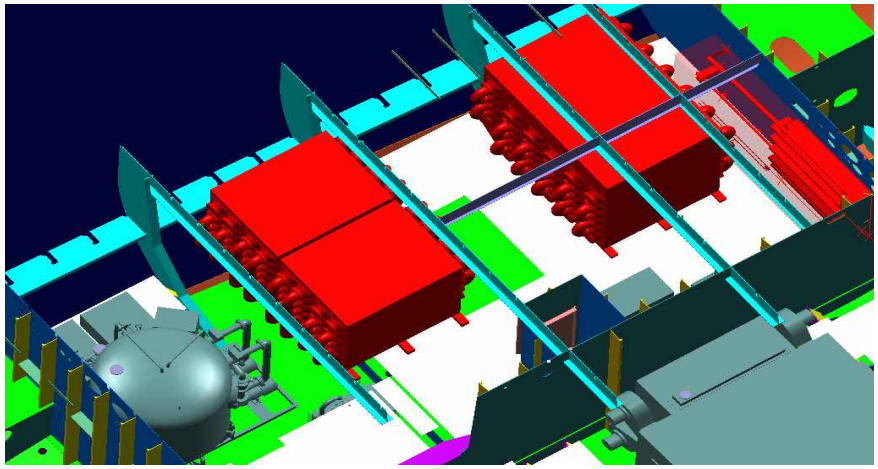
- For LNG/LPG
  - Parallel Project “GasPax”
  - Tank Concept
  - Gas Plant and Distribution
  - Rule- and Regulation Development

The Thermal Process

High Temp Recovery Heat used for Absorpion Chiller Unit (ACU)

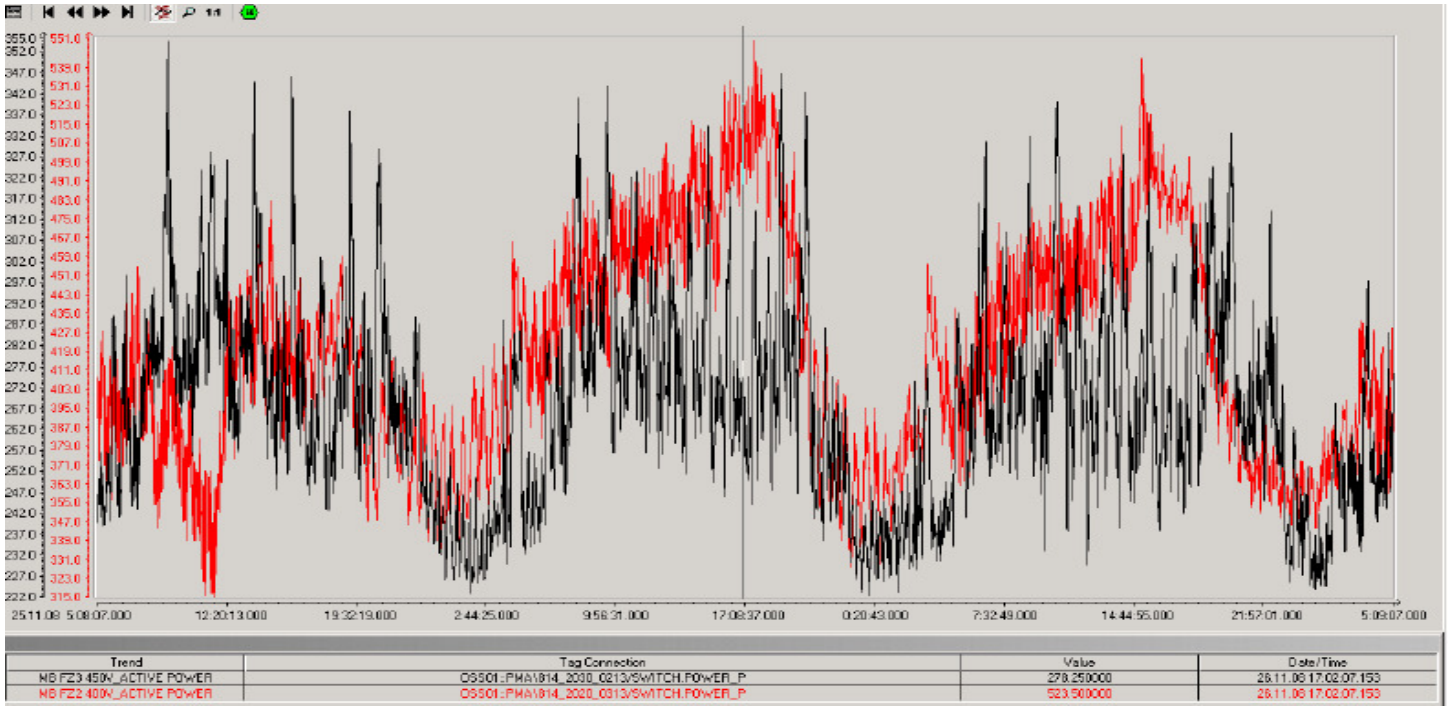
Medium Temp recovery Heat (<70°C) used for Freshwater Production (MED Plant)

ACU produce sustainable Part of Cooling Energy



The Electric Process

- Network Evaluation
- Network Dynamics
- Network Smoothening



The Safety Concept

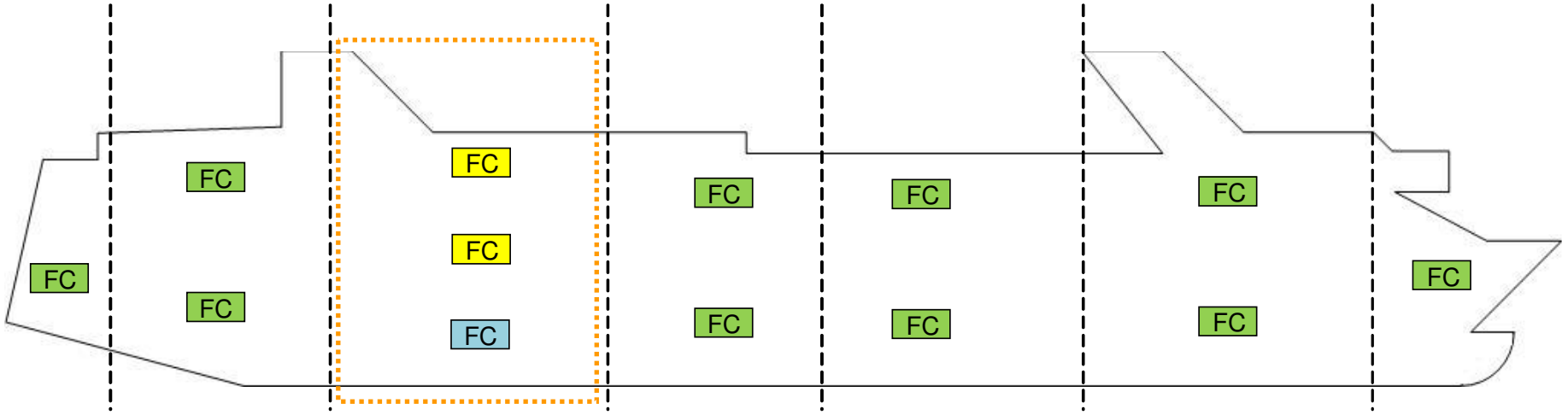
- Experience from DNV / MTU FMEA of „Fellow-ship“ Project.
- Execution of Safety Assesments
- Definition of „Functional Requirement“
- Draft of Rules and regulation

The Economic Feasibility Study

Comparison of

- **Diesel Power Station**
  - 2 Gensets
- **Fuel Cell – Diesel – Power Station**
  - 1 Fuel Cell System
  - 1 Genset
- **Appr. Equal Power**
- **Equal Technical Standart**
  - Redundancy requirements
  - RP, SRtP
- **Thermal Energy Production incl.:**
  - Aux. Boiler Plant
  - Economiser
  - HT Cooling water

Pa-X-ell - Realization Steps



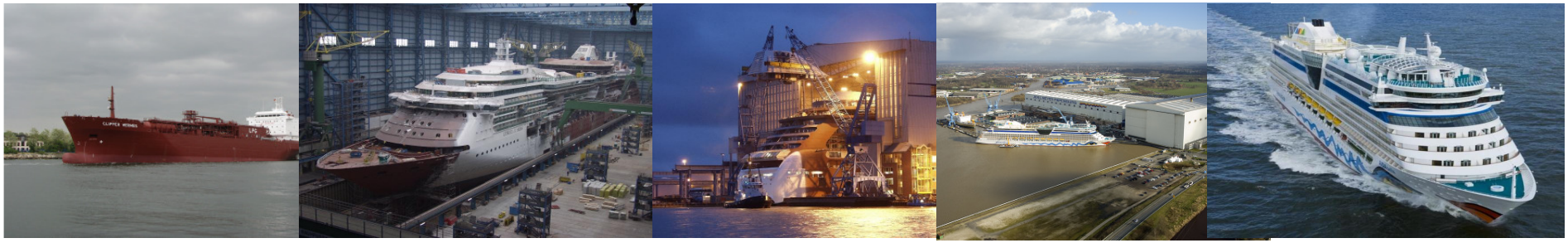
Thank you for your Attention

MEYER WERFT
PAPENBURG 1795

Contact:

Gerhard Untiedt

MEYER WERFT GmbH
Industriegebiet Süd
26655 Papenburg
GERMANY
Phone: +49 4961 81-4362
email: Untiedt@MeyerWerft.de
www.meyerwerft.de



MOTIVATION | CREATIVITY | EXPERIENCE | IMAGINATION | KNOWLEDGE | CURIOSITY | ECONOMIC SENSE