

Collaboration between research and industry - VTT's experiences

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- VTT is one of the leading research and technology organisations in Europe.
- We use our scientific and technological excellence to provide innovation services for our domestic and international customers and partners.
- **Partner of ca 30 FCH JU projects**



Net turnover and other operating income
269 M€ (VTT Group 2016)



Unique research and testing infrastructure



Personnel 2,414



Wide national and international
cooperation network

PPP increases synergies



- Benefits for the research partners like VTT:
 - ✓ More information about industrial challenges
 - ✓ Right direction to the research
 - ✓ More deeply involved with the companies product development
- Benefits for the companies:
 - ✓ Easier to find right research partners
 - ✓ Better informed about the resources of research partners
 - ✓ SME's can be part of large R&D project together with research partners
- Common benefits:
 - ✓ Makes possible to have large joint projects with the common goal
 - ✓ Research partners can be part of companies demonstration programs
 - ✓ Staff exchange

Consolidated strategic R&D agenda - VTT's experience

- Common understanding about strategic choices:
 - ✓ Industrial perspective
 - ✓ Research perspective
 - ✓ Political perspective (EU-level innovation and research strategies)
 - ✓ Two-way process
- Clear working plan
 - ✓ Prioritization of the focus areas (Multiannual plan)
 - ✓ Calls, topics etc. (Annual plan)
 - ✓ List of concrete work to be done
- Very clear and open process in creating R&D agenda

Example from research results - HyCoRA



Targets:

- Decrease the price of automotive grade hydrogen
 - ✓ Reduce the cost of hydrogen fuel quality assurance (QA)
 - ✓ Provide recommendations for current ISO 14687-2:2012 standard
 - ✓ Identifying the impurity limits under actual automotive conditions
 - CO, HCHO (formaldehyde), HCOOH (formic acid), H₂S, HCl

Results:

- Reduce number of analysis methods required for complete QA
 - ✓ From 6 analytical methods to 3
- Impurity limits in ISO 14687-2:2012 → recommendations
 - ✓ In practice formaldehyde at 2.0 ppm has a very small effect: 200 x ISO-limit
 - ✓ In practice formic acid at 20 ppm has a very small effect: 100 x ISO-limit
- Hydrogen fuel quality generally good at HRS

Example from research results - Development process

- From early stage research to (pre)-commercial level:



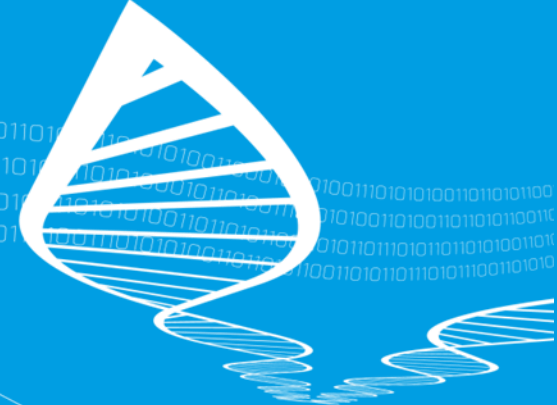
- Optimized system components: ASSENT & CATION
- Improved stack lifetime: SOFC-Life & NELLHI & SCORED 2.0
- Diagnostics tools for stack and system operation: GENIUS & DeSign & DIAMOND
- Proof of concepts: SOFCOM & INNO-SOFC & DEMOSOFC
- High quality and low cost manufacturing: qSOFC
- (Pre)-commercial products: ComSos (1.1.2018 -)**
 - ✓ There will be totally 450 kW_e installed power (23 units) - products validation
 - ✓ Sunfire, SolidPower and Convion

Implementation of the results

- From research to demonstration and commercialization -principle
 - ✓ Public support and research partners make it happen
 - ✓ Research partners' know-how fully available
- Feedback from demonstration to R&D
 - ✓ First generation challenges → improvements for the next generation
 - More focused research
 - Do not necessary load companies' own resources
 - ✓ This could be done more efficiently
- PPP demonstrations generate public information
 - ✓ Final proof of the market ready products
 - ✓ Increase public awareness
 - ✓ Good references for manufacturer to inform end-users
 - ✓ Good piece of information for the investors and financiers

Conclusions

- PPP (FCH JU) is very well working instrument
 - ✓ Creates a well defined route to commercialization
 - ✓ Very clear and open process in creating R&D agenda
 - ✓ Increases collaboration between industry and research partners
 - ✓ Great benefits for both industrial and research partners
- Loop from the demonstration to the R&D could be more efficient
 - ✓ Avoid dead-end demonstration → more active collection of topics for R&D
- These are pretty much subjective opinions from the VTT point of view
 - ✓ Any comments or questions?
- Thank you very much for your time!



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