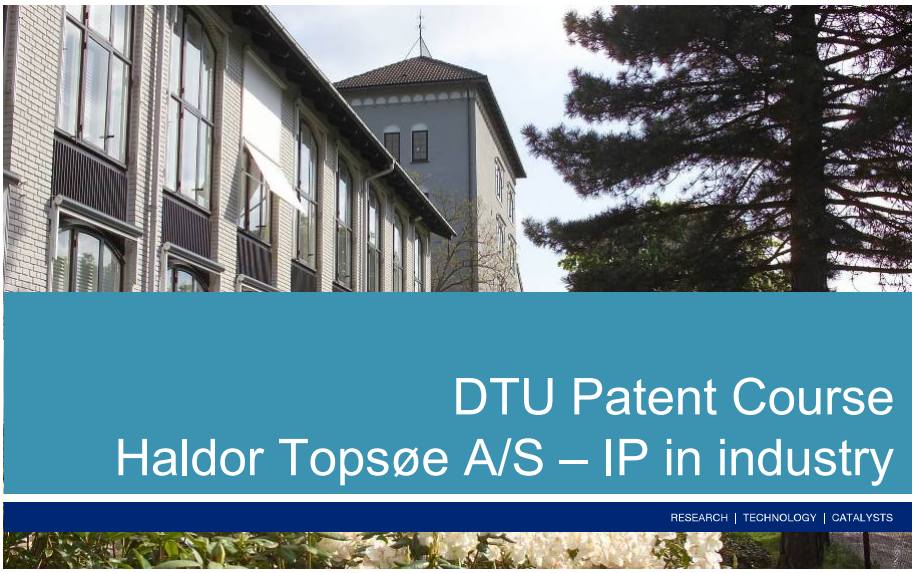


DTU Patent Course
Haldor Topsøe A/S – IP in industry

Johanna H. Jonsdottir / Alfredo Zolin

Outline

- The company Haldor Topsøe A/S
- Dealing with IP rights at Haldor Topsøe:
  - The role of IP in HTAS business
  - Handling employee's inventions
- Haldor Topsøe A/S' global R&D collaborations – an overview

The company Haldor Topsøe A/S

RESEARCH | TECHNOLOGY | CATALYSTS

The company Haldor Topsøe

Headquarters in Lyngby

Revenue 2010: 4201 mill DKK
Net profit 2010: 308 mill DKK

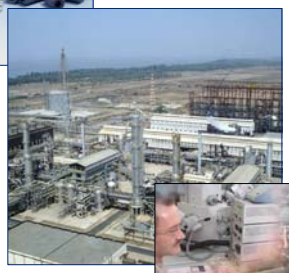
ca. 2200 employees
- 1800 in Denmark

Factory in Frederikssund

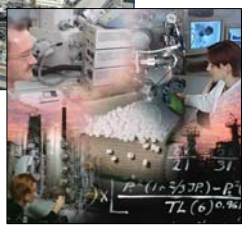
Factory in Houston

What we do

Catalysts
Catalyst Division



Catalytic processes and plants
Technology Division



Research in new catalysts and processes
R&D Division

Company's goals

Second to None!

Science to Dollar$

RESEARCH | TECHNOLOGY | CATALYSTS

What we do

Cleaning and exhaust gas

Climate

Gasoline and diesel

HALDOR TOPSOE

CATALYSING YOUR BUSINESS

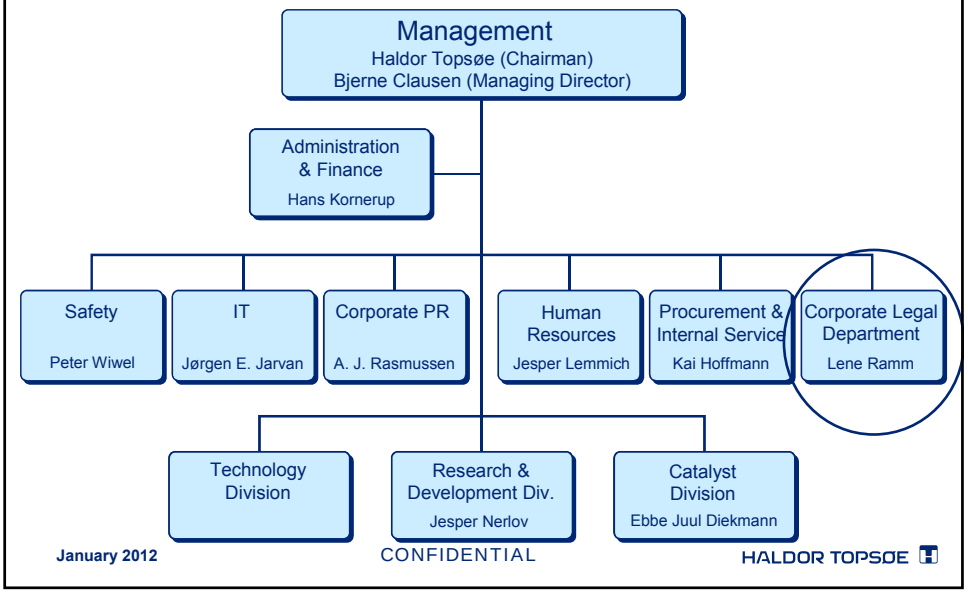
Renewables

GTL Gas-to-liquid

Ammonia and sulfuric acid

Offices worldwide

Haldor Topsøe A/S

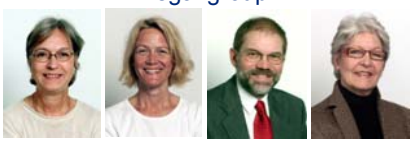


Corporate Legal Department

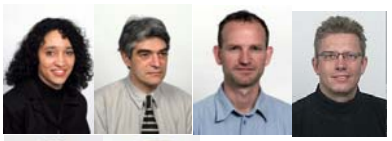
David Juist
Legal Counsel

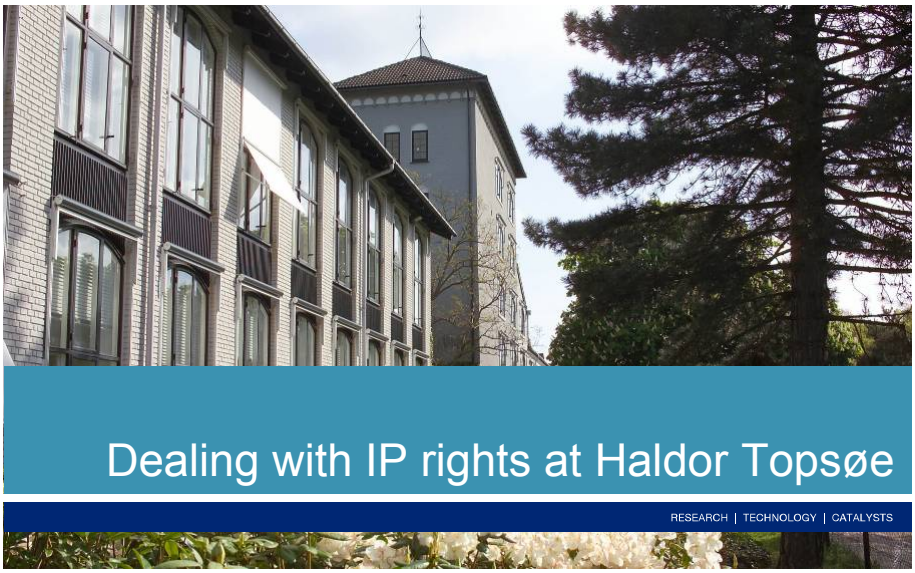
Head of department

Legal group



IPR group





Dealing with IP rights at Haldor Topsøe

RESEARCH | TECHNOLOGY | CATALYSTS

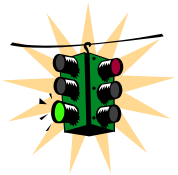
Intellectual Property (IP) in HTAS

- Dealing with IP rights (IPR) in HTAS:

  The role of IP in HTAS business

  Handling employee's inventions

The role of IP in HTAS business



PROTECTION OF HTAS TECHNOLOGY

- **Secure the freedom-to-operate (FTO) of the company**
  Can we sell our products?
- Protection of (long term) R&D investments
- Science to dollars

- Patenting expensive and often long procedure before patent is issued:
  From first priority application to patent: ~ 5 yrs
  Costs for one invention: 0,5 - 1 mill DKK for first 10 yrs in 10 countries

Proprietary equipment

- Ammonia synthesis converter
- Autothermal reformer
- Hydroprocessing reactor internals
- Heat exchange reformer
- Process gas waste heat boiler
- Secondary reformer burner
- Convection reformer
- CTS burner
- Methanol decomposition reactor
- Methanol reactor
- Tubular steam reformer
- WSA condenser

The role of IP in HTAS business

- An example:

  One of several HTAS patents involving TIGAS technology

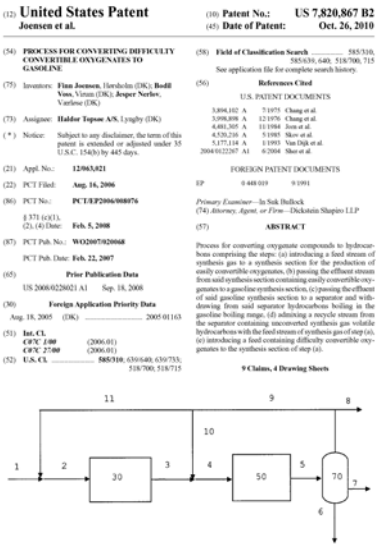
  US patent 7820867

  First filing, priority: Aug 18, 2005

  Patent issue: Oct 26, 2010

  Patent family: applications pending and/or issued in other countries/regions

  More than 15 patent families within this technology



(12) **United States Patent**
Joensen et al.

(10) **Patent No.: US 7,820,867 B2**
(45) **Date of Patent: Oct. 26, 2010**

(54) **PROCESS FOR CONVERTING DIFFICULTY CONVERTIBLE OXYGENATES TO GASOLINE**

(75) Inventors: **Finn Joensen**, Hersholm (DK); **Bodil Voss**, Virum (DK); **Jesper Nerlov**, Vanløse (DK)

(73) Assignee: **Haldor Topsøe A/S**, Lyngby (DK)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 445 days.

(21) Appl. No.: **12/063,821**

(22) PCT Filed: **Aug. 16, 2006**

(86) PCT No.: **PCT/EP2006/008076**
§ 371 (c)(1),
(2), (4) Date: **Feb. 5, 2008**

(87) PCT Pub. No.: **WO2007/020068**
PCT Pub. Date: **Feb. 22, 2007**

(65) **Prior Publication Data**
US 2008/0228021 A1 Sep. 18, 2008

(30) **Foreign Application Priority Data**
Aug. 18, 2005 (DK) 2005 01163

(51) **Int. Cl.**
C07C 1/00 (2006.01)
C07C 27/00 (2006.01)
(52) **U.S. Cl.** **585/310**, 639/640, 639/753; 518/700, 518/715

(58) **Field of Classification Search** 585/310, 585/639, 640, 518/700, 715
See application file for complete search history.

(56) **References Cited**
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3,894,102 A 7/1975 Chang et al.
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4,481,305 A 11/1984 Jorn et al.
4,520,216 A 5/1985 Skov et al.
5,177,114 A 1/1993 Van Dijk et al.
2004/0122287 A1 6/2004 Shoi et al.

FOREIGN PATENT DOCUMENTS
EP 0 448 019 9/1991

Primary Examiner—In Suk Bullock
(74) *Attorney, Agent, or Firm*—Dickstein Shapiro LLP

(57) **ABSTRACT**

Process for converting oxygenate compounds to hydrocarbons comprising the steps: (a) introducing a feed stream of synthesis gas to a synthesis section for the production of easily convertible oxygenates, (b) passing the effluent stream from said synthesis section containing easily convertible oxygenates to a gasoline synthesis section, (c) passing the effluent of said gasoline synthesis section to a separator and withdrawing from said separator hydrocarbons boiling in the gasoline boiling range, (d) admixing a recycle stream from the separator containing unconverted synthesis gas volatile hydrocarbons with the feed stream of synthesis gas of step (a), (e) introducing a feed containing difficulty convertible oxygenates to the synthesis section of step (a).

9 Claims, 4 Drawing Sheets

The role of IP in HTAS business

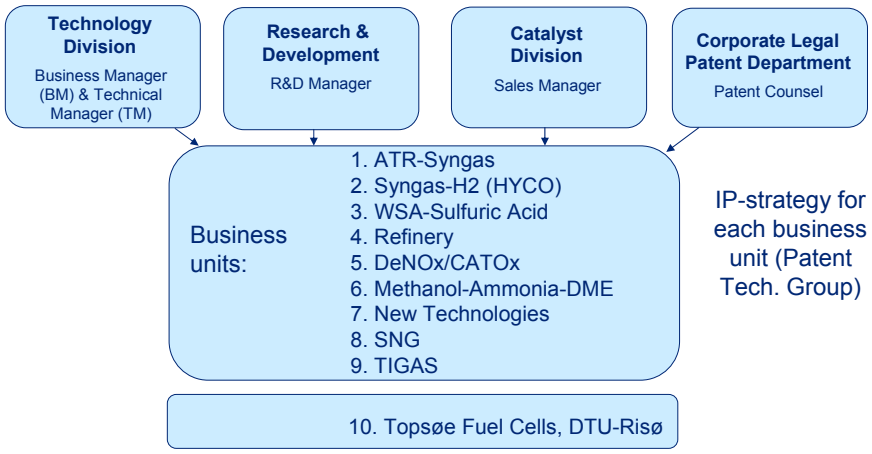
An example…

Proactive use:

- In South America…Patents as proof of outstanding technology...avoid public bid
- ”SNG technology contract in China. Client asks for list of our SNG patents…”
- WSA technology in China…original HTAS patents expiring. Competitors now intending to enter the market…

The role of IP in HTAS business

Definition of IP-strategy for each business (Patent Tech. Group)



The role of IP in HTAS business

IP-work within Business Units:

- Regular meetings to reach decisions about IP
- Patent, publish only – defensive patenting, secrecy
- Patent surveillance. Invalidation of competitor patents
- Selection of countries for patent prosecution
- Trimming of patent portfolio. Commercial relevance
- Trademarks
- Other IP-tasks

Handling employee's inventions

CONFIDENTIAL

IP-workflow

- In-house novelty search for new inventions based on general description of invention:
  within ~2 weeks
- Filing of priority patent application: within ~3 months
  after receipt of IDF by inventor.
  IDF: Invention Disclosure Form
- Check-mark priority level

INVENTION DISCLOSURE FORM (IDF)

….

1. **Title:**

2. **Level of priority. Please check-mark below:**
   What level of priority should this invention have.

   ___High (1). Core technology. Product/process introduction to market soon. High competitor activity on the same. Upcoming conference/Fair/Symposium

   ___Medium (2). Core technology. Market introduction within foreseeable future

   ___Normal (3). Preliminary laboratory tests being conducted. Non-core technology. Exploratory ideas.

   Comments:

Handling employee's inventions, cont..

IP-workflow

- Check-mark whether or not to patent…decision within Business Unit (Patent Techn. Group)
- Patent decisions in general…within each Business Unit (Patent Techn. Group)
- The better the Inv. Disclosure Form, the better the patent application
- If scient. article in preparation, information in patent appl. ≥ information in scient. article

INVENTION DISCLOSURE FORM, cont..

2. **Requirements for approval for patenting, cf. IP-strategy. (Approval usually AFTER a novelty search has been conducted by the Patent Department).**

   Please confirm by check-marking below:

   ___ Yes, the patenting of this invention has been approved by the Technology and Business Manager of the relevant Patent Technology Group

   ___Yes, a copy of this INVENTION DISCLOSURE form with the approval of the Technology and Business Manager has been sent to the other managers of the relevant patent technology group

   If in doubt about relevant Patent Technology Group, please ask Patent Counsel.

3. **Describe the proposed invention as fully as possible. Include the best way known to you of performing the proposed invention**
   .
   .
   .

In-house patent activity

- New inventions for in-house search and patentability assesment:

  80-100 per year

- New patent applications (priority appl.):

  40-50 per year

- New other IP-counselling cases concerning other's patent rights:

  30-50 per year

  …and on the rise…

- In addition, invalidations (oppositions EPO, Req. Exam. US):

Haldor Topsøe A/S' global R&D collaborations – an overview

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Haldor Topsøe's global R&D Collaborations

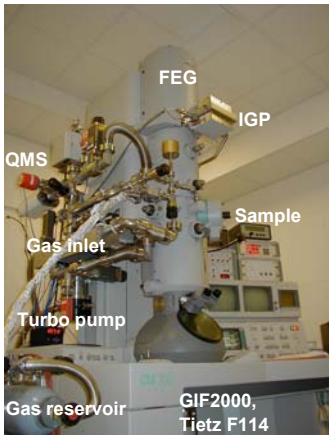
An overview of:

- Why?
- With whom?
- About what?
- How?
- Policies
- Key issues in collaborations
- Procedures

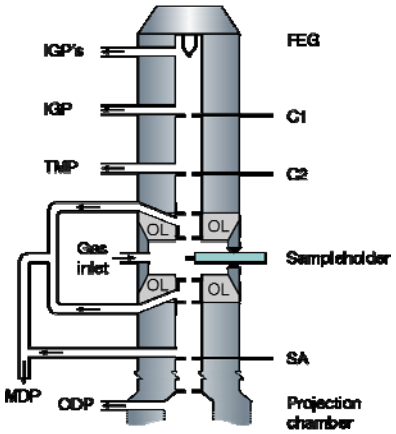
Haldor Topsøe's R&D activities

- Second to none within its businesses
- Huge in-house R&D effort
- Activities ranging from nano-scale to fullsize plants
- On the cutting edge within R&D
- Many patents (>95% in-house inventions)
- Vast contribution to R&D collaborations
- A very attractive collaboration partner

From studying reactions on atomic level …



Philips CM300-ST FEG:



In situ conditions:
- P = 10-20mbar
- F = 10-50Nml/min
- T = 600-900°C

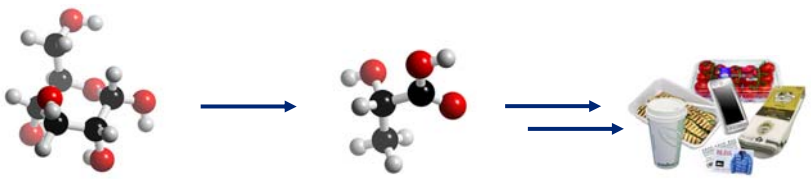
…. to large scale petrochemical plants

Why R&D collaborations

- Solve specific problems
- Complement own competencies
- Tap into new competencies
- Public funding
- Talent scouting

Haldor Topsøe's collaboration areas

- Within most of our business and research areas
- Mostly blue sky and fundamental reseach
- Never close to our core business / critical proprietary know-how which we want to protect



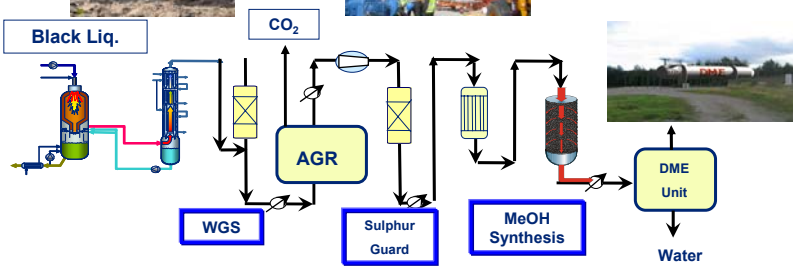
Glucose *Lactic acid* *Biodegradable plastics & solvents*

Haldor Topsøe's collaboration partners

- Formal and informal collaborations
- Universities and R&D institutes worldwide
  - DK
  - Nordic countries
  - Europe
  - Russian and former SNG
  - Canada, USA
  - Others…..

Piteå: 4t/d Black Liquor to Green DME demo

Start up 3rd Q 2011



CHEMREC DELPHI ETC HALDOR TOPSOE TOTAL VOLVO

Formal R&D collaborations

- M.Sc. and B.Sc. projects
- Co-finansed ph.d. projects
- Public funded projects
- R&D research centers
- Co-finansed collaboration projects
- Industrial ph.d. projects
- Contract research
- Consultants

The process of R&D collaborations

- The start
- Decide on topics, plan, participants, budget and the parties' contribution

  ↑ easy part

  ↓ not so easy part
- Formal Collaboration Agreement with all the above plus the critical issues such as IP, confidentiality, publishing, rights to commercial exploitation, settlement of disputes, etc……..

Critical issues in collaboration agreements

- Protection of proprietary know-how
- Confidentiality
- Publishing
- IP
- Patenting and cost sharing
- Rights to commercial exploitation
- Price for IP and exploitation rights
- Settlement of disputes

Negotiation and more critical issues

- Industry and universities have different mindsets
- Lot of energy used to agree on issues that may never become relevant in reality
- Rigid interpretation of the Danish ”University law”
- Common misunderstanding:

Invention → patent = money rolls in

Policies for Topsøe's R&D collaborations

- Collaborate with the best
- Cultivate a wide global scientific network
- Synergy
- Complement our own competencies
- Collaborate on Blue Skye R&D (completely new R&D)
- Have the right to use results commercially
- Protect our proprietary know-how
- Publishing within reasonable limits

Haldor Topsøe's position in

- Ownership of inventions/patent applications
- Control of the patenting process
- Commercialisation
- Confidentiality
- Publishing
- Disputes

A showcase of Danish industry/public collaboration

- The collaboration between Topsøe Fuel Cell A/S and RISØ started in the late 1980'ies.
- The results of that collaboration is at the forefront within solide oxide fuel cells (SOFC) (and solid oxide electrolysis (SOEC)).
- Status?

- Learn more about Haldor Topsøe by visiting:

http://www.topsoe.com/

http://www.topsoefuelcell.com/

Questions?

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