Innovative energy technologies need innovations for penetrating sustainable market

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Royal Institute of Technology (KTH) and Mälardalen University (MDU), Sweden
Editor-in-Chief, Applied Energy & Advisory Editor of Energy Procedia
The issues:
- tech. innovations need innovations for implementing them into applications
- Miss-matches: stakeholders, funding, south-north cooperation, innovation-market ...

Solutions:
- global cooperation with local (market) focus
- Net- (to) -working

Actions:
- start with specific tasks and do it now
18 (15%+) elements were discovered by Swedish Scientists

Sweden: population: 0.14% of the world total

PERIODIC TABLE OF THE ELEMENTS (BY COUNTRY OF DISCOVERY)

References:


Original from Sweden:
No.1 of international companies per capita

Logos of companies such as ABB, AGA, AKZO NOBEL, ASSA ABLOY, AstraZeneca, Atlas Copco, Autoliv, biovitrum, EF, Electrolux, ELEKTA, ERICSSON, GAMBRO, H&M, IKEA, SAAB, SANDVIK, SCA, SECURITAS, SKANSKA, SKF, STORAENSO, SWEDISH MATCH, TELE2, TeliaSonera, Tetra Pak, VATTENFALL, and VOLVO.
R&D and GDP growth

The diagram shows the relationship between average R&D investment from 2004-09 and GDP growth in 2010. The size of the bubbles represents the R&D investment, while the position on the graph indicates the level of GDP growth. Countries are represented by their country codes, as labeled on the diagram.
The valley of death into challenge basin

**Applied Energy**
- International Journal
- International conference
- Innovation Institute
- Networking and expertise
- Projects
- Innovation competition/Innovation cup
- Innovation fund

**Method:**
Collaborative Creativity
Needs driven
Organized without organization
Open platform

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Resources
- Academia
- SMEs

Challenge Basin
- Technology push
- Technology pull

Invention
- Innovation Infrastructure

Level of Development
- ERC Research at Universities
• How to engage all stakeholders from technology innovations to the market to create win-win-win sustainable business?

• How to promote international cooperation into implementation?
Need an on-site platform/institution with international cooperation and network

Need innovations for the international cooperation with focus on market implementation

Solutions?
APPLIED ENERGY NETWORK

- An international Journal: APEN:
  - Impact factor 4.8:
    ISI: No. 6 in both Energy & Fuels and Chem. Eng.
  - Downloads 1.7 million in 2013
  - No. 4 by Google Scholar in Sustainable Energy Category
  - SJR No. 1 in Energy (Miscellaneous), No. 4 in Energy Eng. & Power technology

- ICAE: International Conference on Applied Energy

www.applied-energy.org
ICAE 2014:
Abstracts 1200+ from over 61 countries
About 700 papers/participants
The 7th International Conference on Applied Energy

Important dates:
- Submission open: July 10, 2014
- Abstract: August 31, 2014
- Full paper: Oct. 15, 2014
- Final paper: Jan. 30, 2015

Special Issues of selected papers from ICAE2015 will be published in prestigious journals including Applied Energy.

icae2015@applied-energy.org
Applied Energy Innovation Institute:  
*Global strength with local focus*

**Global strength:**
- Over 10,000 international experts in Applied Energy network
- Frontline of clean technologies & innovations
- Close cooperation with European Small and Medium Enterprises (SMEs)
- Collaborative creativity

**With Local Focus:**
- Physical hub/incubator with international standard service
- Matching the market needs
- Strong local manufacturing capacity
- Joint efforts with Investors
- Cooperation with local governments and other stakeholders
Applied Energy Innovation Institute: Offices of 3000 square meters with all facility for you to incubate your innovation.
<table>
<thead>
<tr>
<th>Scope</th>
<th>Business Model</th>
<th>Process</th>
<th>International Network</th>
</tr>
</thead>
</table>

THE APPLIED ENERGY INNOVATION INSTITUTE
AEii = International + China & Applied Energy + Innovation Platform

International: Applied Energy

China: Innovation Platform
AEii = International + China & Applied Energy + Innovation Platform
Multi-dimension matching

- Technology Landscaping
  - R&D universities
  - SMEs
  - Searching and analysis
  - Virtual labs

- Market demanding
  - Manufacturing
  - Local gov’t
  - Science parks

- Capital Investing
  - Venture capital
  - Knowledge funds

- Talent recruiting
  - Universities
  - R&D center
Scope of AEii

- Partners: R&D inst., Industry, investors
- New Tech
- New Product
- End-user system
- International Standard & Consulting
- Patents
- Prototype
- System Integration
- Portfolio of Tech
- Products
- Europe
- China
- Europe Market
- China
- Products
- Prototype
- Marketing
Scope

ENERGY

Renewable Energy

Energy efficiency & emission mitigation

Energy storage and new materials

Cross-cutting issues
Win-Win business model

- Applied Energy
- SMEs
- R&DD

Quality
Benefits
Efficiency

P1
P2
P3

R

market
Investment

Ltd 1
Ltd 2
Ltd 3
Ltd n

THE APPLIED ENERGY INNOVATION INSTITUTE
Organisation and management

- China Team
  - Advisory committee
- The board
  - CEO
    - Management
  - Market
  - Proto-type
  - Tech. group 1
  - Tech. group 2
  - Tech. group 3
- International team

Prepartion
- Human resource
- Registration
- office
- Working plan

Project
- Project
- Tasks
- Implementati
- Demo.

Project Develop.
- New Projects
- Finance
- Team work

Innovation Fund
- domestic
- Internatioanl
- Business model

Market penetration
- Sales & distribution
- New business model
Actions?
Technologies innovations

- Humid Air Turbine
- Intelligent Solar Pumping
- Membrane CO2 capture
- Mobilized TES
- Biodiesel micro-reactor
- Bio-CH4 fuels
- Black liquor gasification
- ......
Technologies innovations

- Humid Air Turbine
- Membrane CO2 capture
- Bio-CH4 fuels
- Black liquor gasification
- Intelligent Solar Pumping
- Mobilized TES
- Biodiesel micro-reactor

THE APPLIED ENERGY INNOVATION INSTITUTE
Solar PV Water Pumping for ecological conservation of grassland
Market Potential and Cashflow

Market potential =
global PV total installation capacity

Payback time

Graph showing market potential and cashflow with different payback times for different ton/ha values.
Module Integration

Module 1: PVWP mapping
- Solar radiation
- Water resource
- Grassland
- Soil
- Livestock density
- Combination map

Module 2: PVWPsim & design

Module 3: PVWPiRRig

Module 4: PVWPMon & cont

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PV water pumping sizing optimization

Legend
PVWP system size
Value
High : 6 kWp
Medium : 3 kWp
Low : 0 kWp
II M-TES system

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PCM and economic feasibility

(a) cube cells  (b) sphere cells  (c) cuboid cells
III Microreactor for biodiesel production

- 处理后的废弃油脂
- 泵
- 混合器
- 反应器
- 分离器
- 生物柴油
- 甘油
- 甲醇
- 泵
- 小型集成式生物柴油制备系统

图示显示了微反应器的结构及其各部分的连接方式。
Net-(to)-Working
Overview of Authors

Indication of origin of the corresponding authors
Worldwide Scientific Contributions (2013)

- 5000+ Submissions
- 65+ Countries
- 10,000+ Reviewers
Impacts (2013)

1000 Publications

4.781 Impact factor

1,700,000 Downloads
 SJR: No. 1 in Energy (Miscellaneous)

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Applied Energy Expert Forum
Swedish Corresponding Platform
(Future Energy Platform in Sweden)
ca 10 Million Euro supported by Swedish Knowledge Foundation + industrial partners. (2013—2019)

Steering Committee
- Future Energy Director (Prof. Jinyue Yan)
- International advisory board

Track 1
Renewable Energy (Prof. Jinyue Yan)

Track 2
Energy Efficiency & Emission Mitigation (Prof. Björn Karlsson)

Track 3
Smarter modelling/optimization & management (Prof. Erik Dahlquist)

MDH
Professor Jinyue Yan
Professor Erik Dahlquist
Professor Björn Karlsson

ABB
Professor Rebei Bel Fdhila
Tomas Lagerberg
Dr. Bengt Stridh
Lars Krantz
Dr. Carl-Fredrik Lindberg
Dr. Birger Drugge

YIT, ASP-HOLM-EN

Länsstyrelsen i Västmanland, Handelskammaren i Mälardalen, Exportrådet, Regionförbundet, Västerås Stad, Eskilstuna Kommun, IVL, SLU, KTH, Uppsala Universitet

Conferences: ICAE, IGEC, SIMs ...
International research networks ...

THE APPLIED ENERGY INNOVATION INSTITUTE
The Applied Energy Innovation Institute

**Call for Innovation Ideas**
- May 30: Announce Day
- Oct. 1: Evaluation
- Dec. 1: Submission
- Feb. 1: Evaluation 2
- May-Aug: Summer Camp
- Sept: Final

**Process**

- **Call for innovation ideas**: May 30
- **4 pages project**: October 1
- **Business plan 10 pages**: December 1
- **Summer Camp 50 days at AEii**: February 1
- **Committee: short listed candidates**: May
- **Evaluations: 5 finalists**: August
- **Final prize winner + (investment from AE Innovation Fund)**: September

**Timeline**

- **May 30**: Call for innovation ideas
- **Oct. 1**: Business plan
- **Dec. 1**: Summer Camp
- **Feb. 1**: Evaluations
- **May-Aug**: Final prize winner
- **Sept**: Final
EU-China CSC Applied Energy Program (PhD and Post-Doc)

- Cooperation between CSC and 15+ European Universities
  2013-2019

- ca 200 MRMB scholarship for 100 PhD students and 50 post-docs
Partners in Applied Energy CSC Program
EU-China CSC Applied Energy Programme
(Phase I: 2014-2019)
(draft version & confidential)
Organisation

CSC-APEN Porg
Management Team (Coordinator)
Academic Supervision Committee
Advisory Board

Partner 1
Partner 2
Partner 3
Partner 4
......
Partner N

Area I
Area II
Area III
Area IV
Area V
Area VI

Industrial partner 1
Industrial partner 2
Industrial partner 3
Industrial partner 4
......
Industrial partner n

Exchane Students
China

Students EU

Integrated Projects
Thanks

www.ae-innovation.org