

KIC InnoEnergy

A sustainable energy future for Europe

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Industry Program Management Officer

EIT Awareness – March 18th, 2016 – Athens

Our Vision and Mission

The vision

To become the leading engine for innovation and entrepreneurship in sustainable energy.

The mission

KIC InnoEnergy's mission is to build a sustainable long-lasting operational framework amongst the three actors of the knowledge triangle in the sustainable energy sector:

Industry, research and higher education.

And ensure that the integration of the three is more efficient and has higher impact in innovation (talent, technology, companies) than the three standing alone.

Our goal: sustainable energy

Ensure security and safety of supply

Reduce costs in the energy value chain

Reduce CO₂ emissions

Improve European competitiveness

Remove barriers to innovation

Encourage sustainable growth

Create jobs



Thematic fields and technology focus



Clean Coal and Gas Technologies



Energy Storage



Energy Efficiency



Energy from Chemical Fuels



Renewable Energies



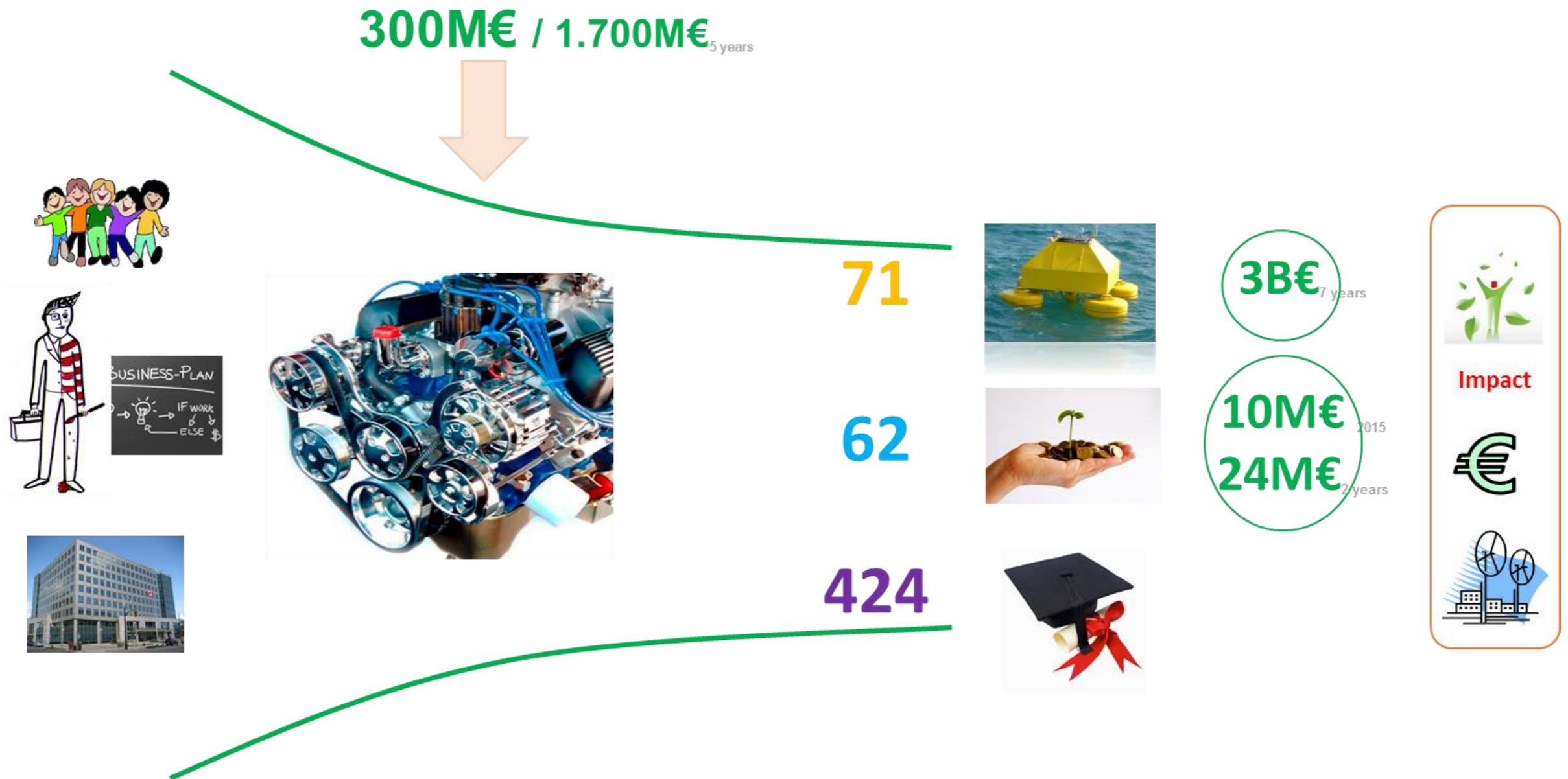
Smart and Efficient Buildings and Cities



Smart Electric Grid



Sustainable Nuclear and Renewable Convergence



**A trusted innovation ecosystem
with unique assets...delivering impact**

In 2013 SolabCool, a dutch SME, erected a new manufacturing site, created the initial 8 new jobs and disrupted the market with a product (cold out of waste heat) developed in an InnoEnergy project. On the right side you can see the 8 first employees and further on the right the inauguration of the factory by the Regional Minister of the Dutch Government.

**Industrialization of Europe
 Direct jobs created**



In 2012, 5 students from KIC InnoEnergy Master programs came second in the Bill Clinton Hult Global Challenge, winning over the major Universities and Business Schools. Today 4 of the 5 students are successful entrepreneurs, 2 of them are cash flow positive companies.

**New talent
 Game Changers**



41% less NOx emissions
 in 50MWt boilers



Reducing maintenance
 Time and cost by 80%



Offshore LIDAR at 2M€,
 vs. 10M€ current market



KIC VC Community: 850M€ at hand

Disruptive technology, used

High Growth Companies

SMEs related to KIC InnoEnergy raising round 3 investments for further development: KIC InnoEnergy is today a "quality" trusted brand. When investor (public and private) need to decide where to put their money, the fact that a project or an SME is supported by KIC InnoEnergy automatically is judged as of quality. The best example is Minesto, a young company nurtured by KIC InnoEnergy, which just (2015) raised 18M\$ in a recent IPO in the Stockholm Nasdaq, largely oversubscribed. Please see press release <http://www.hydroworld.com/articles/2015/10/minesto-fully-funds-deep-green-mhk-technology-after-raising-us-17-2-million.html>

In Innovation in Energy

- Delphos®:** Tool adopted by off-shore wind community linking innovation and LCOE

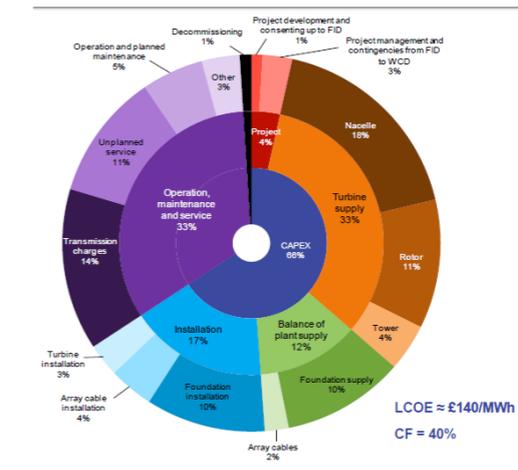
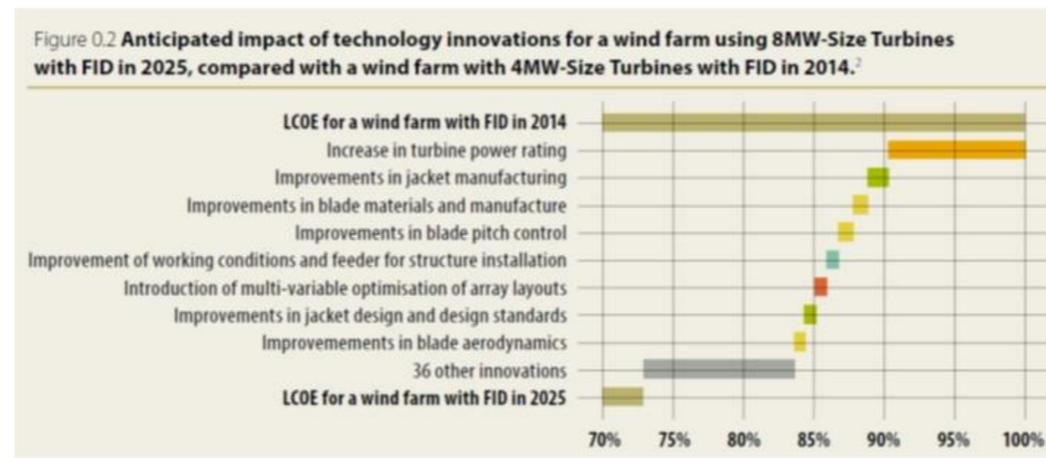
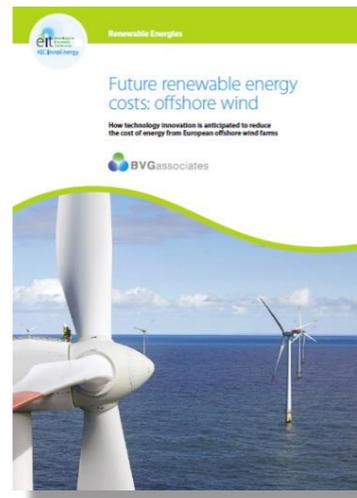


Figure 1 Proportion of LCOE for a typical wind farm constructed in 2013

- Insight-E contract (DG Ener) + REEM:** Adviser to the policy maker
http://www.insightenergy.org/ckeditor_assets/attachments/48/pr1.pdf



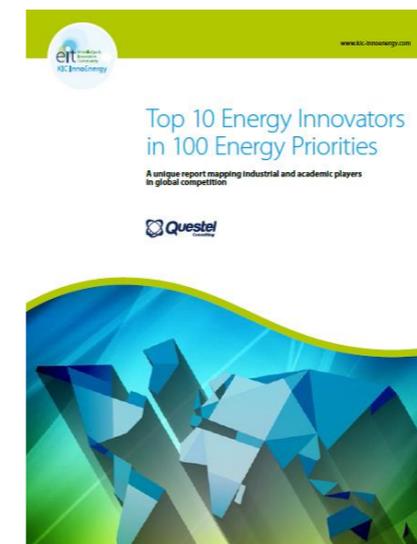
How can batteries support the EU electricity network?

Lead Author: Bo Normark (E.ON Energy)
Authoring Team: Aurélie Faure (E.ON), Paul Deane (E.ON), Steve Pye (E.ON)

Legal notice: Responsibility for the information and views set out in this report lies entirely with the authors.

This report is also available on our website: www.insightenergy.org

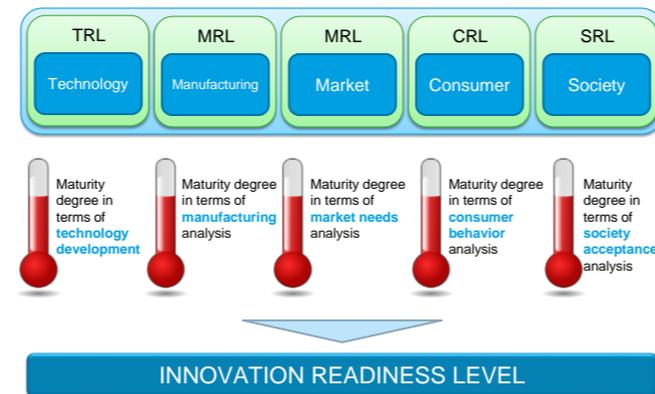
- Top 10 innovators in sustainable energy report:** Referenced by the Energy Union



The INSIGHT_E project is funded by the European Commission under the 7th Framework Program for Research and Technological Development (FP7-2007-2013). The publication reflects only the views of the authors, and the European Commission cannot be held responsible for its content.

In Innovation and entrepreneurship at large

- **Innovation Readiness level (IRL®):** From TRL to comprehensive approach (to be adopted eventually by DG Ener and DG R&D&I)



- **KIC InnoEnergy & Veolia Germany joint programme for entrepreneurs:**
<http://www.energynet.de/2016/02/08/u-start-foerderung-energie-startups-kicinnoenergy-veolia/>



- **2 entrepreneurs in the Forbes Top 30 worldwide:**

<http://www.forbes.com/30-under-30-europe-2016/social-entrepreneu> e4857a0b58ef71c461ec



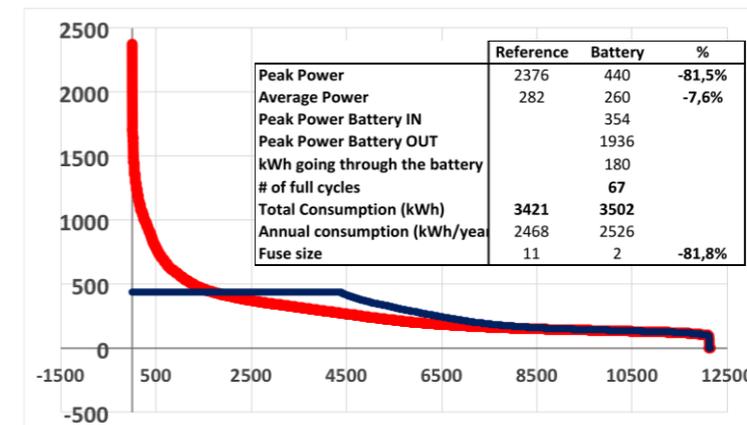
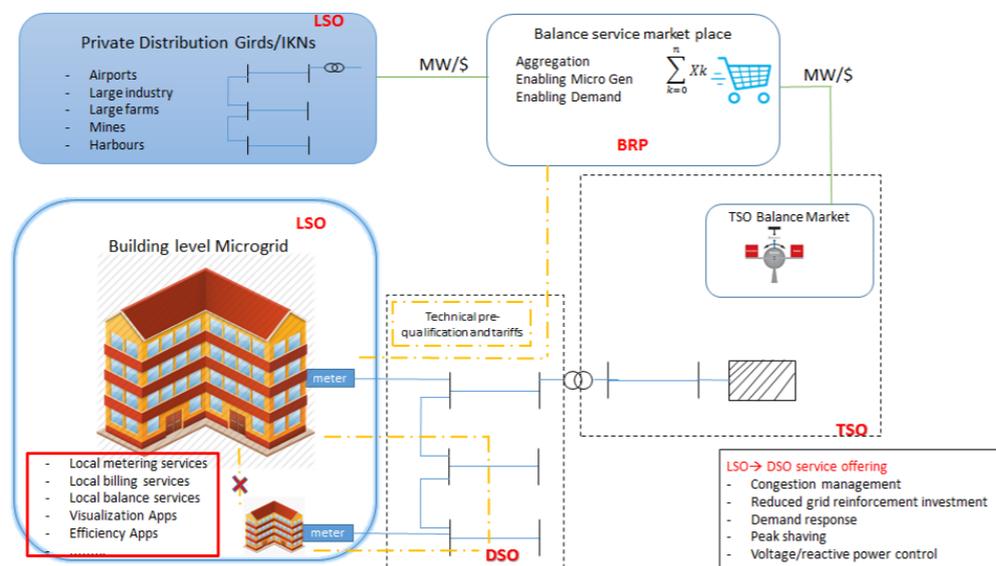
In Creating Markets that did not exist, under a BOT model

- North Sea Grid:** Reducing high single digits European wholesale prices by linking (HVDC links) seven countries around the North Sea.



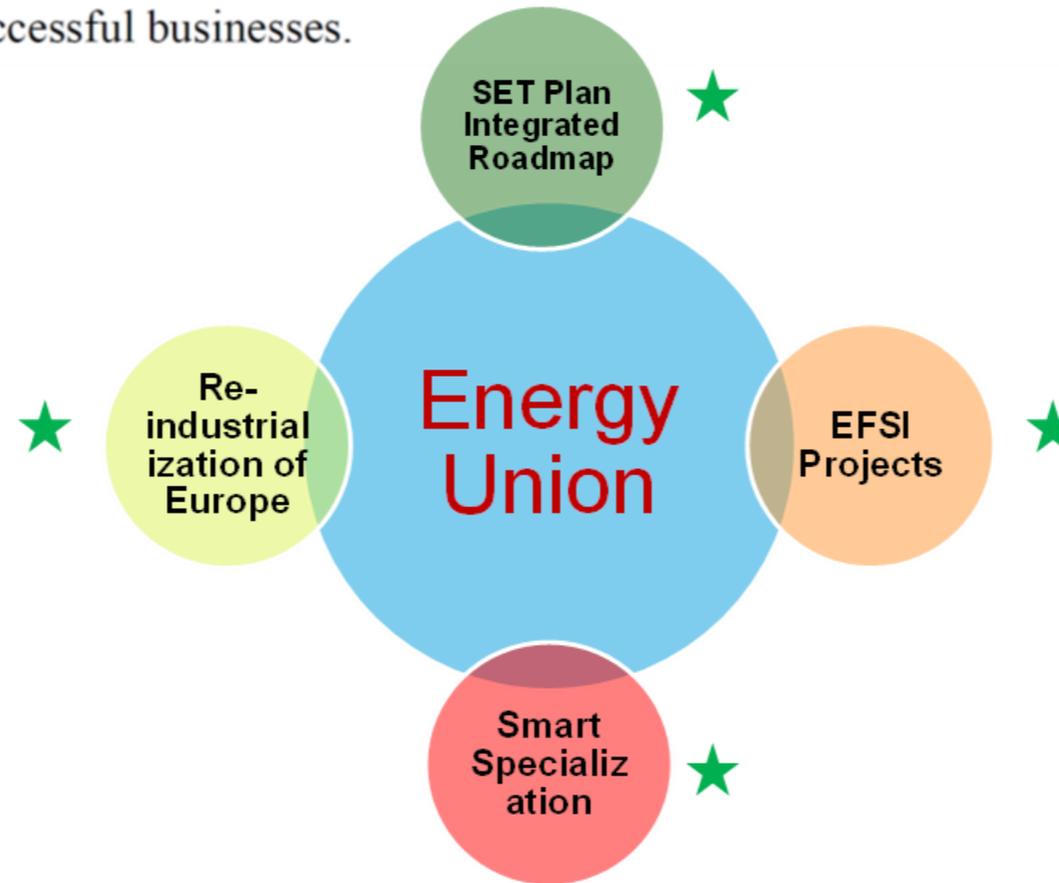
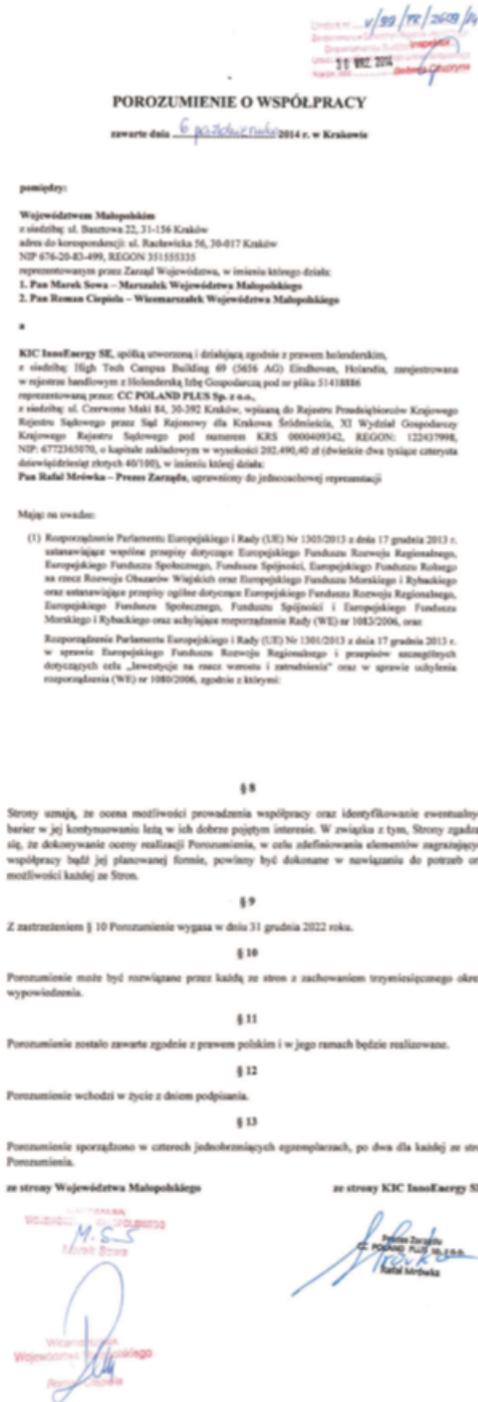
8% decrease wholesale price
20B€ investment
~ 3-4 years payback

- Energy4you:** Creating a new market player in the value chain, the consumer ripping 40%+ savings, transparently



10 Achievement 2011-2015 (6/9)
A fully integrated Energy Union player actively contributing

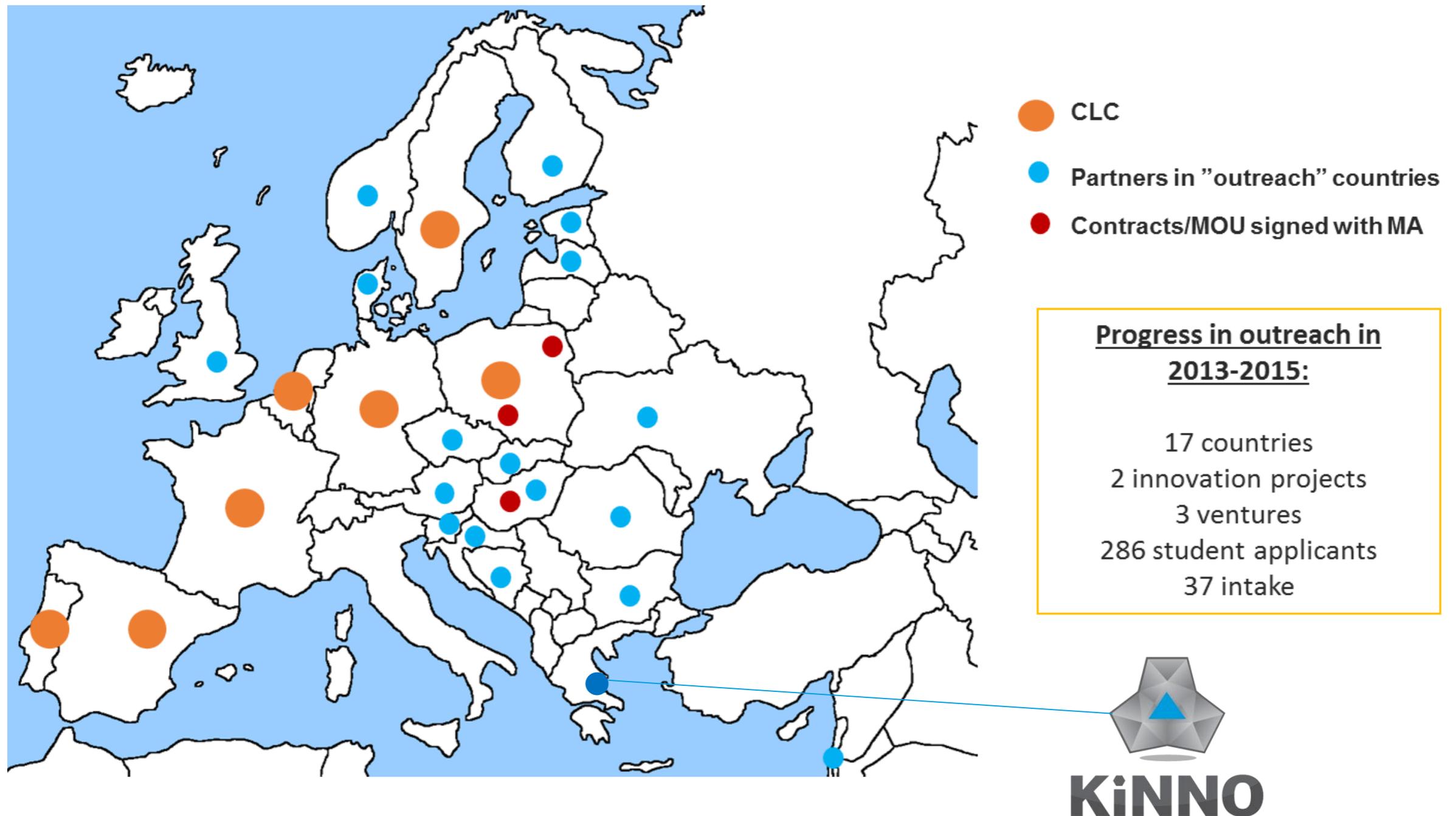
State support to the key actions. The future SET Plan will strengthen its collaboration with the Knowledge and Innovation Community (KIC) InnoEnergy of the European Institute of Innovation & Technology (EIT) to identify innovative projects and bring them to the attention of investors or companies that can turn these innovations into successful businesses.



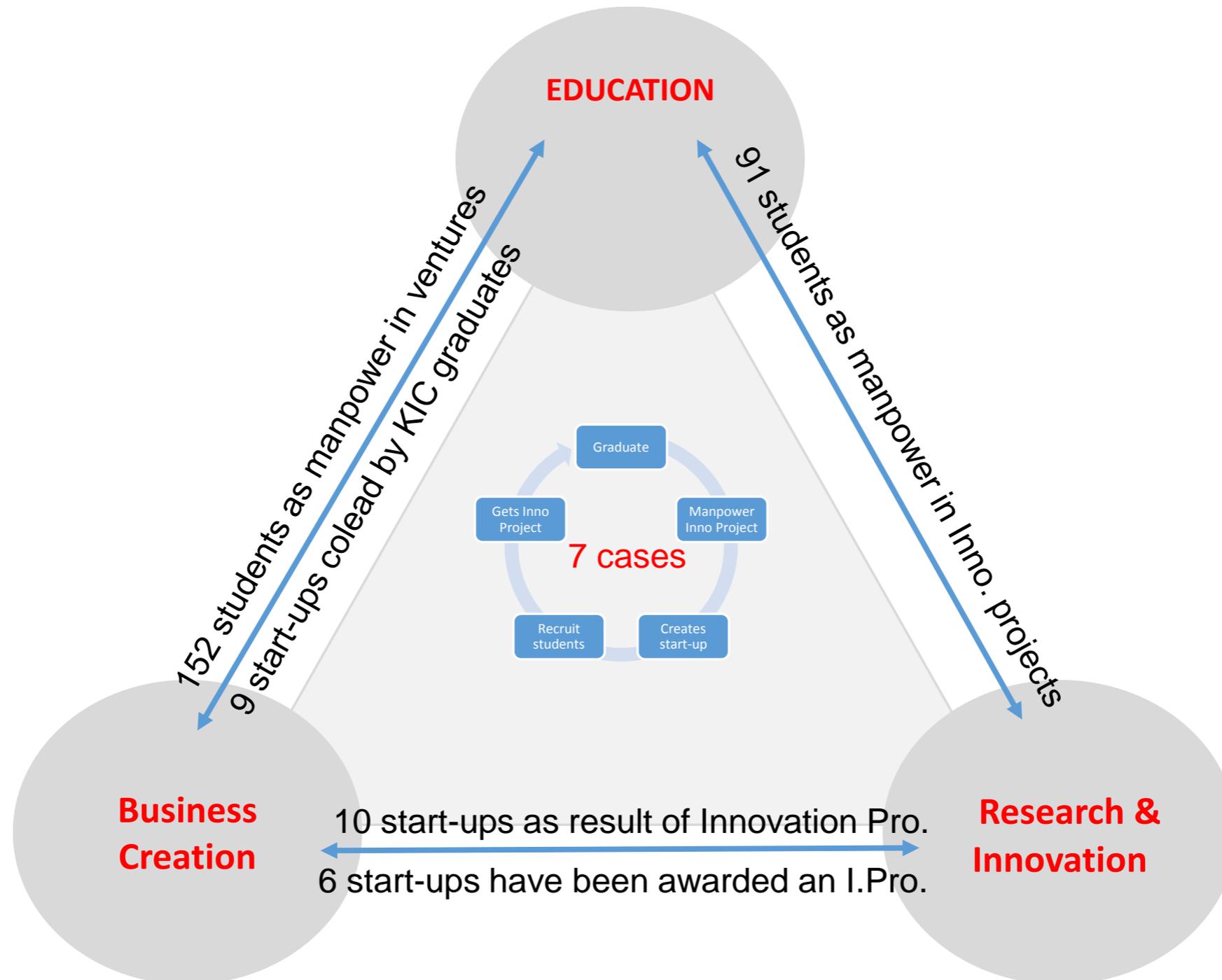
89 KIC InnoEnergy & Questel Consulting, "Top 10 Energy Innovators in 100 Energy Priorities: A unique report mapping industrial and academic players in global competition", January 2015



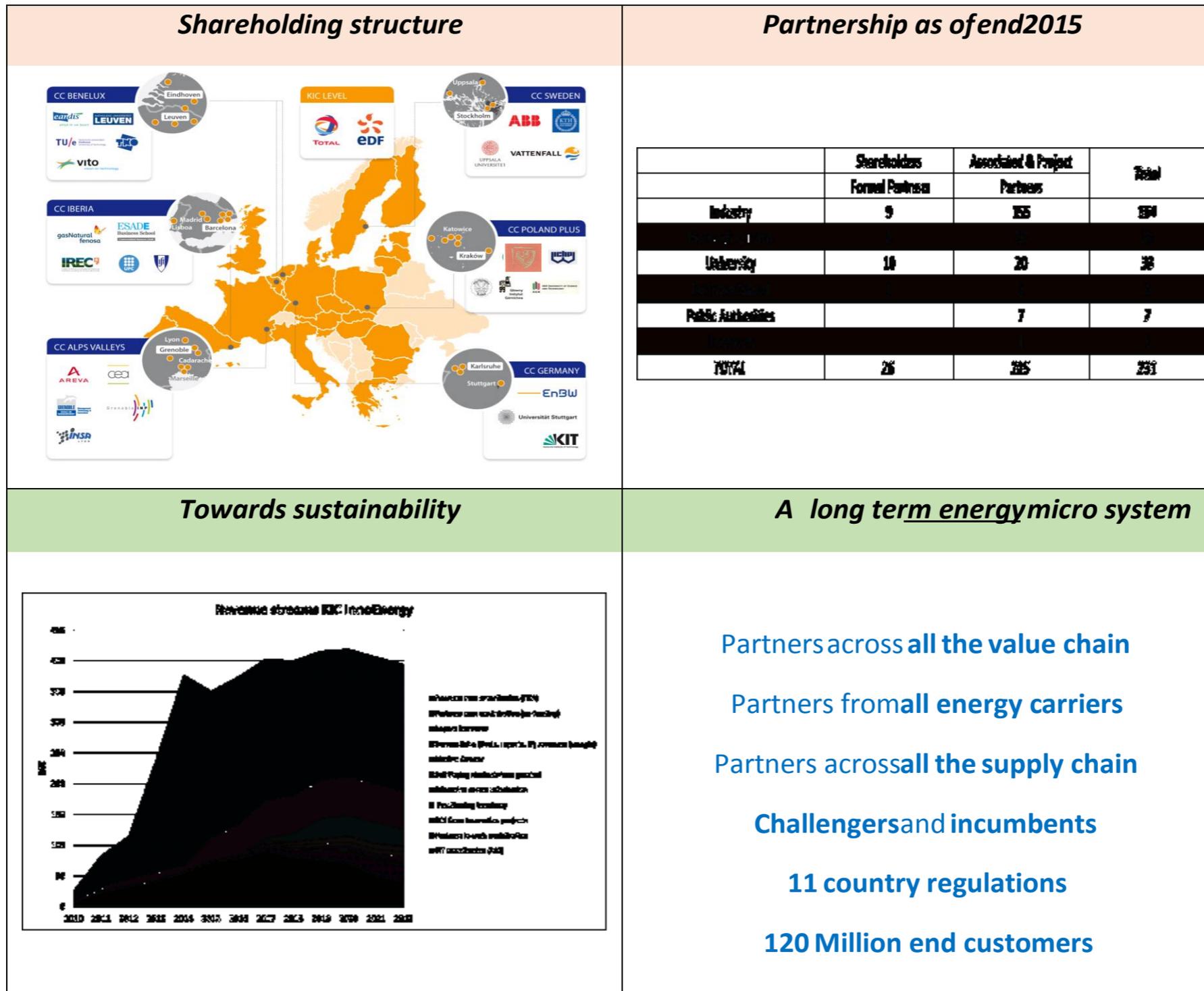
Based on excellence, cooperative, synergetic



A very liquid Knowledge Triangle



The leading engine for innovation and entrepreneurship in Sustainable Energy



Thank you.

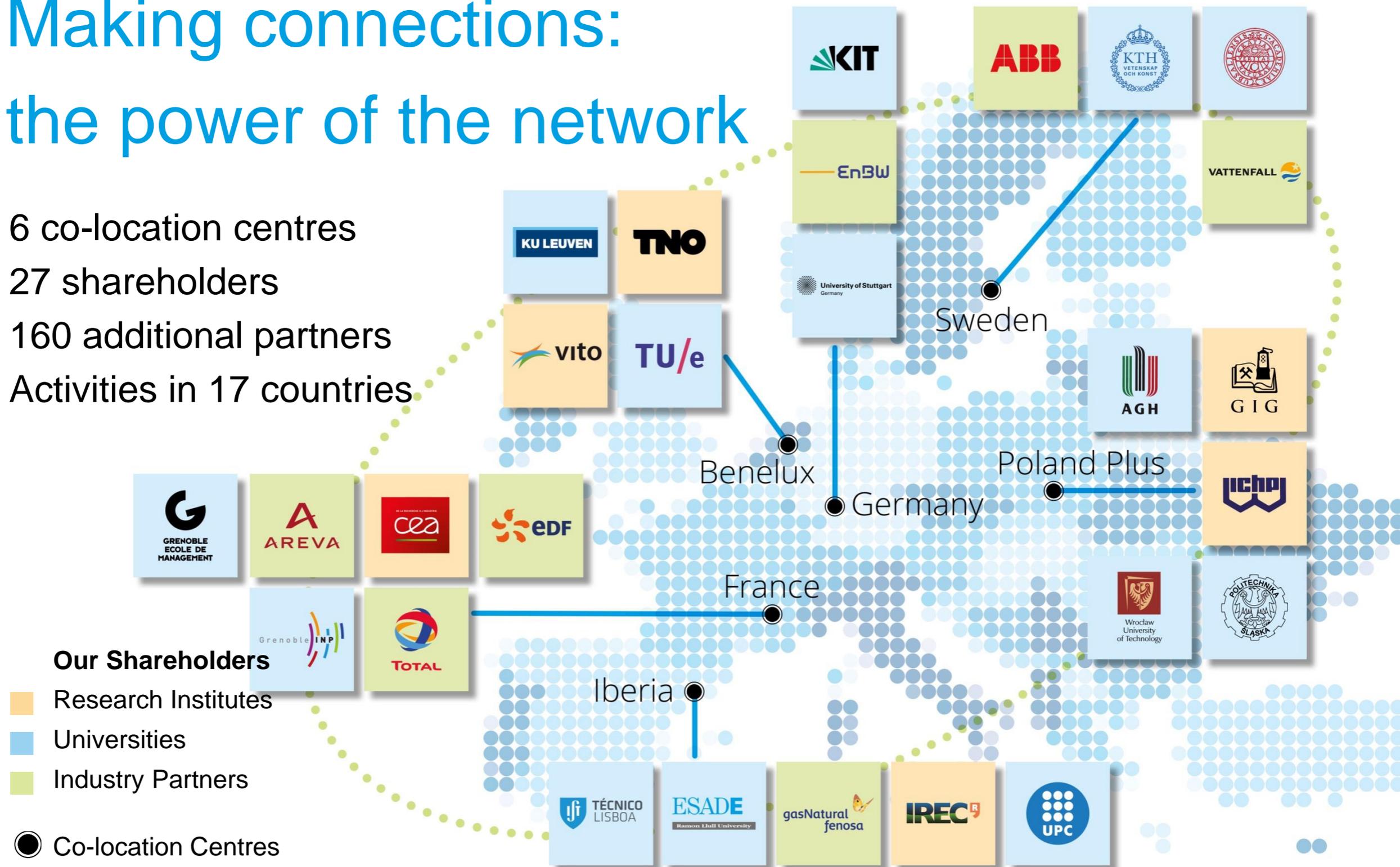
-  facebook.com/kicinnoenergy
-  twitter.com/KICInnoEnergy
-  linkedin.com/company/kic-innoenergy
-  youtube.com/user/InnoEnergy

Additional slides for Q&A

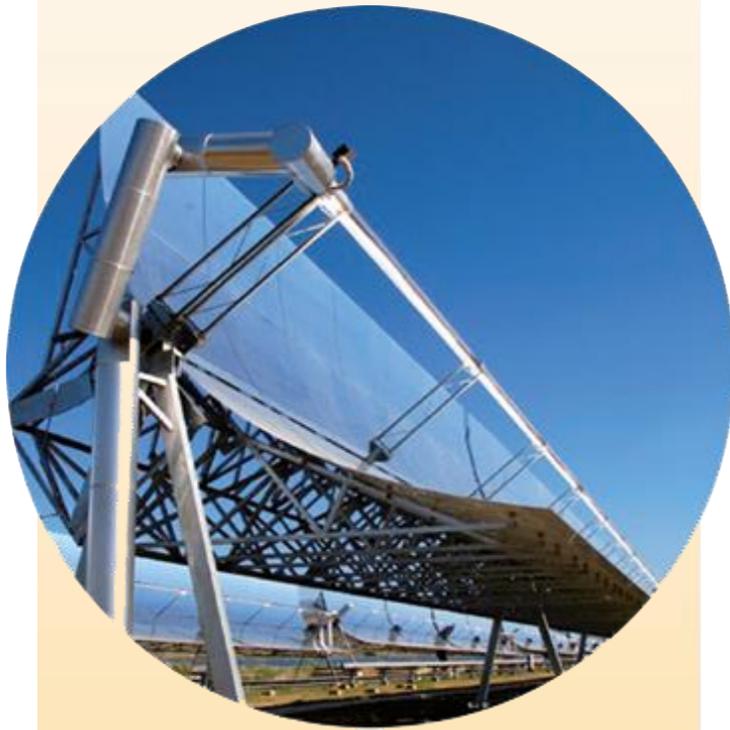


Making connections: the power of the network

6 co-location centres
 27 shareholders
 160 additional partners
 Activities in 17 countries



For every stage of the innovation journey



Innovation
Projects



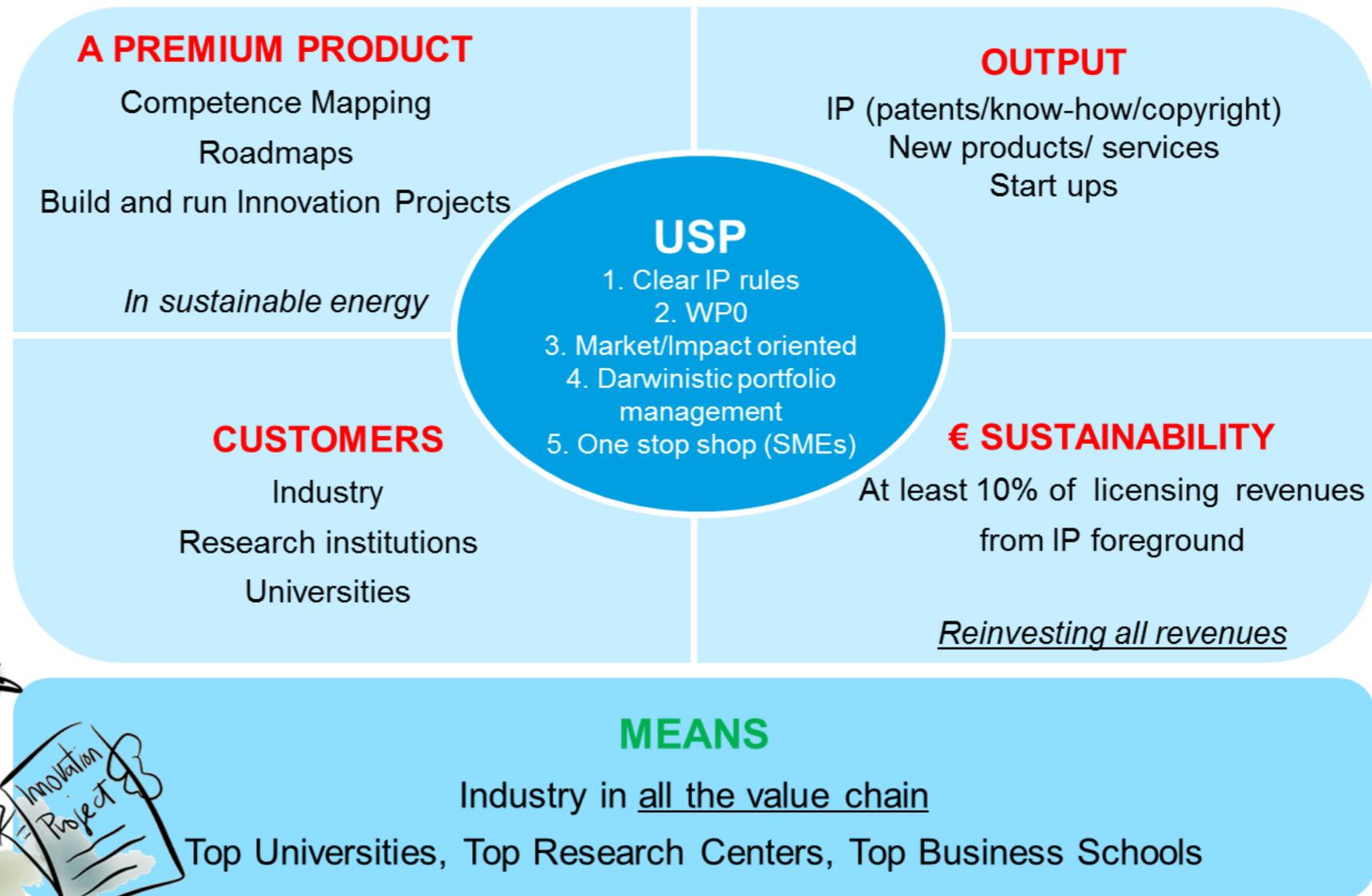
Business
Creation Services



Education

Connecting ideas and industry, innovators and business partners

Transforming knowledge into money



Connecting entrepreneurs and start-ups to markets and customers



Four dimensions:
 1. Human
 2. Technology
 3. Market
 4. Finance



A PREMIUM PRODUCT

The Highway™

OUTPUT

Start-ups or spin-offs

USP

1. Specialized (SE)
2. The Highway™
3. European Network
4. Quality on services
5. First customer

CUSTOMER

Intra/extra KIC entrepreneur
 Early stage & very initial growth phase

€ SUSTAINABILITY

X% equity in start-ups in exchange of added value services rendered

Reinvesting all capital gains

MEANS

Our PROs and Academia, Our industries, external players
Brokerage to funds (BA, VC)



Connecting graduates and employers, researchers and industry

Creating the game changers of the future



EIT labelled:
 • mobility
 • Entrepreneurship
 • hands on (intern)
 • business case
 • market orientation
 • mobility

A PREMIUM PRODUCT

Msc School
 PhD School
 Executive Programs
 LLL/LM
 MOOC

OUTPUT

“CxO” of energy companies
 Top researchers
 “different mindset”

USP

1. Quality of HE institutions
2. Program contents
3. Mobility
4. Double degree
5. No commitment

CUSTOMERS

Bachelors
 Engineers
 Mid Career professionals
 MOOC Customers

€ SUSTAINABILITY

Off-setting tuition costs
 MOOC/LM
Reinvesting all revenues

MEANS

Top Universities
 Industry in all the value chain
Top Business Schools



Innovative solutions

Neptune
*Wind power
from sea to sea*



Renewable Energy

DeBugger
*Making the most
of biomass*



Energy from
Chemical Fuels

EFFIC
*Improving
efficiency and
cost of Solar PV*



Renewable Energy

24

Solutions used
by industry

3

Manufacturing
facilities constructed

59

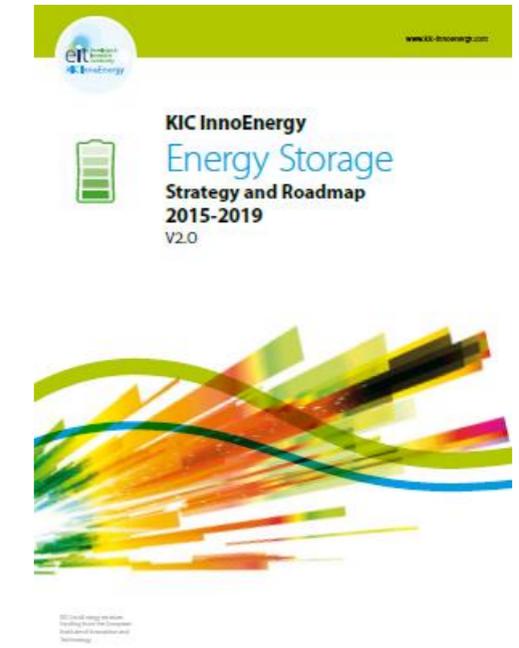
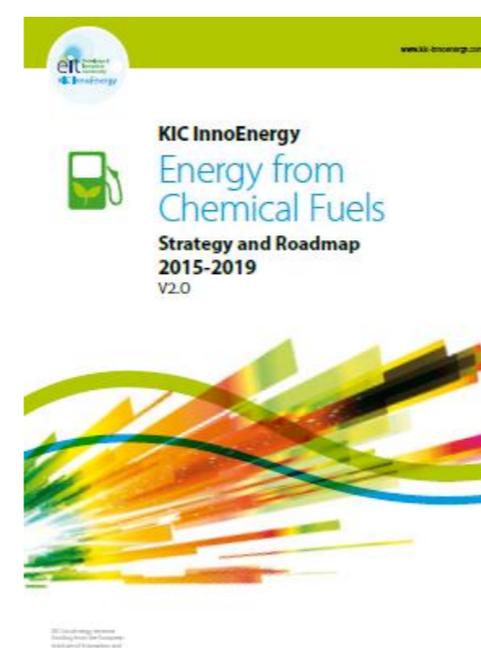
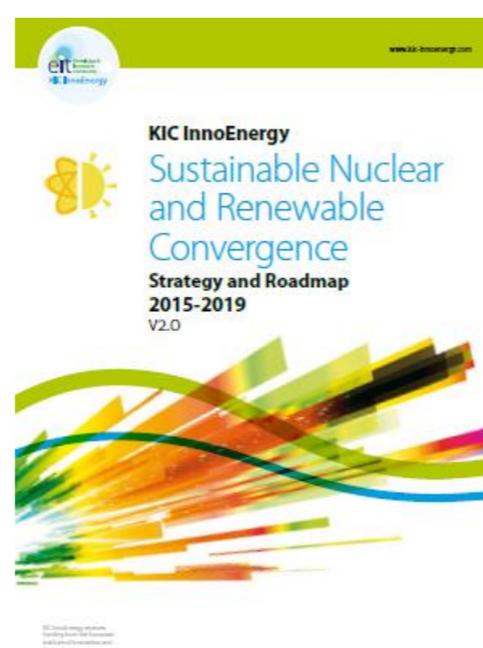
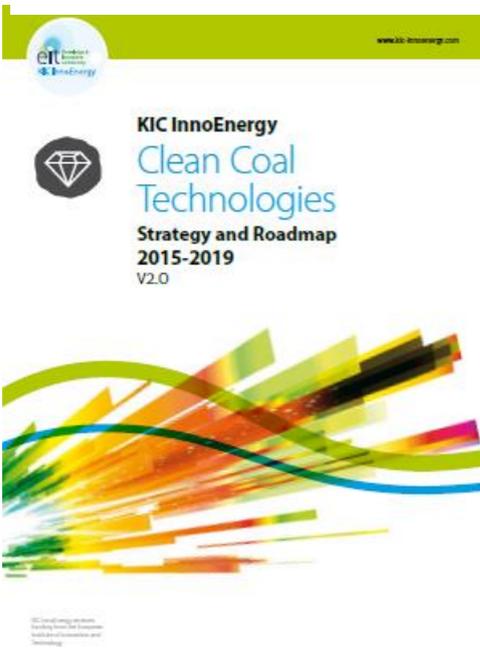
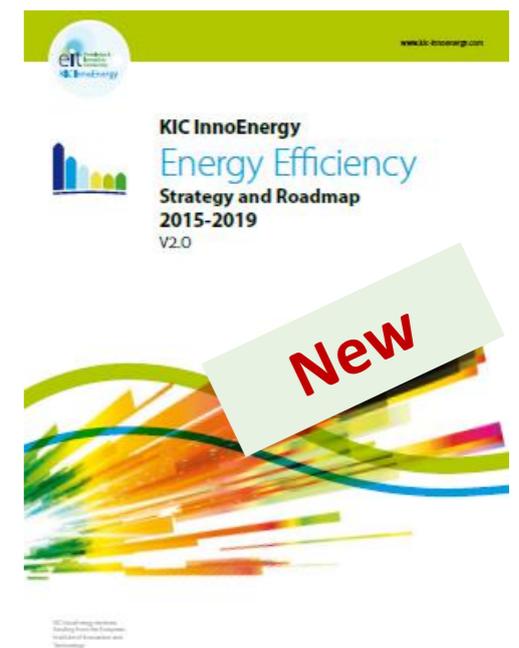
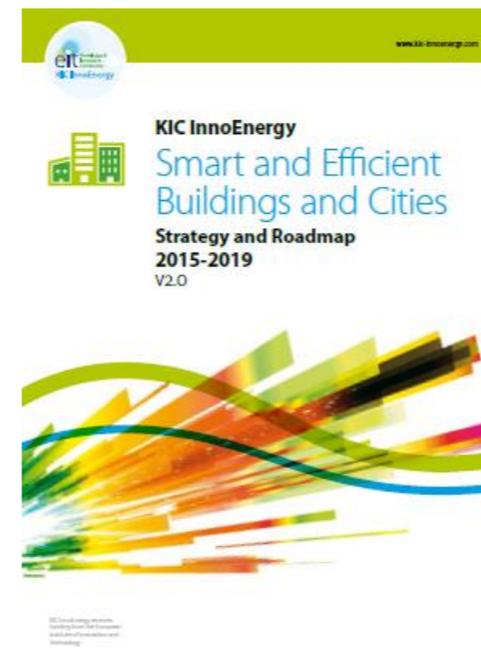
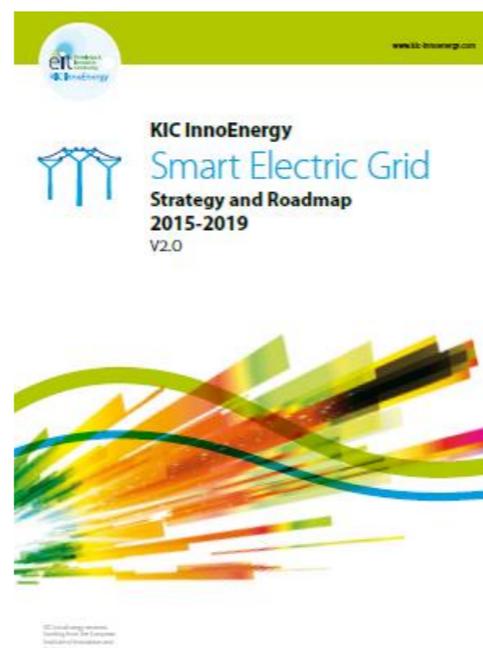
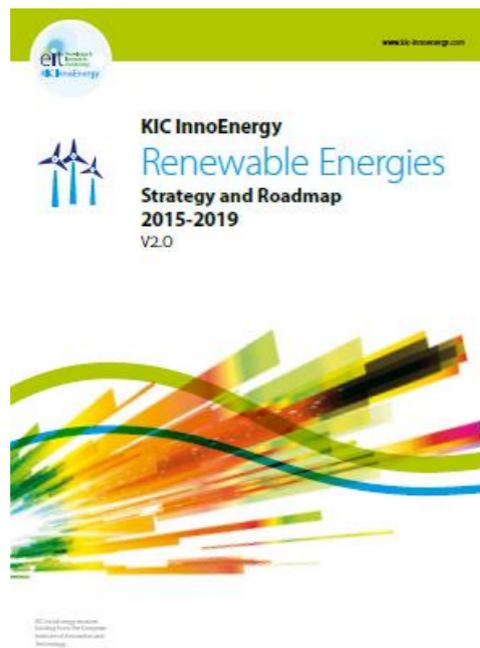
Patents filed

160

Project partners
across Europe

Internal assets: Strategy and Roadmaps

<https://cip.kic-innoenergy.com/>



Internal assets: Innovation Impact Reports

<http://www.kic-innoenergy.com/reports/>



Internal assets: Top 10 Reports

<http://www.kic-innoenergy.com/top-10-energy-innovators-in-100-energy-priorities/>

Monitoring systems for wind farms and operation & maintenance

Monitoring systems based on data management and acquisition from meteorological and environmental conditions. Data measured and predicted to execute operation and maintenance processes.

INDUSTRY PLAYERS

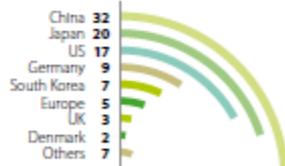
Inventive activity has increased very rapidly since 2006, much more rapidly than the average annual growth rate observed for the whole renewable energies sector. Patent filings in wind farms and O&M are led by specialised players such as Vestas, Mitsubishi and General Electric. The presence of Gamesa and Honeywell at the top is owing to their relevant collaborations with main players. Gamesa is involved in several research projects with academic, industrial and utility players. In 2010, Repower extended its business in Romania by acquiring Elcomex. In 2012, Nordex entered the market in Central America by acquiring BAE in Honduras. TEPCO and Toshiba also made acquisitions. Tepco acquired AGL Energia and Toshiba Sigma Power and Unison.

1,017 Patent Families

26.9 % CAGR 2000-2011

Top 10 reference Companies

#	ASSIGNEE	COUNTRY	IP	VALIDATION
1	Vestas	Denmark	**	**
2	Mitsubishi Heavy Industries	Japan	**	**
3	Gamesa	Spain	*	**
4	Hitachi	Japan	*	*
5	General Electric	United States	**	*
6	Honeywell	United States	*	**
7	Nordex	Germany	*	**
8	Siemens	Germany	*	*
9	Repower Systems (Servion SE)	Germany	*	*
10	Samsung	South Korea	*	*



Geographical distribution of priority countries (%)

Evolution of patent filings



ACADEMIC PLAYERS

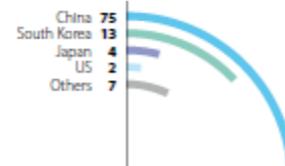
There are many Asian universities ranked in the top 10. They are led by huge Asian research centres, such as CEPRI or Korea Electro Technology Research Institute. CEPRI's number of patents is significantly higher than that of other patent owners. CEPRI is also involved in important collaborations with universities. CEPRI belongs to the State Grid Corporation of China, the world's largest electricity utility. University of Ryukus and North China Electric Power University are among the top 10 thanks to their high number of publications.

208 Patent Families

39.8 % CAGR 2000-2011

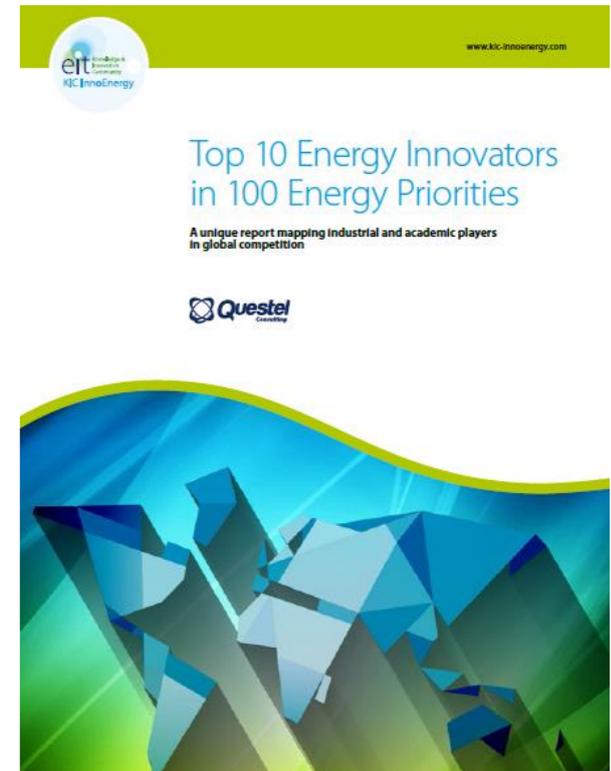
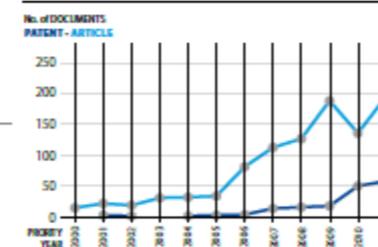
Top 10 reference Research Institutions

#	ASSIGNEE	COUNTRY	IP	PUBLICATION	VALIDATION
1	North China Electric Power University	China	*	***	*
2	University of Ryukyus	Japan	*	***	*
3	Cepri - China Electric Power Research Institute	China	**	*	**
4	Tsinghua University	China	*	*	*
5	Nanjing University	China	*	*	*
6	Shenyang University of Technology	China	*	*	*
7	Southeast University	China	**	*	*
8	Tianjin University	China	*	*	*
9	Ciemat - Centro de Investigaciones Energeticas	Spain	*	*	*
10	University of Zhejiang	China	*	*	*



Geographical distribution of priority countries (%)

Evolution of patent filings and article publications



New Entrepreneurs

Dracula Technologies
*See the light with
printed PV cells*



France
Renewable Energy

OpenDomo
*Measuring energy
consumption with
Artificial Intelligence*



Iberia
Smart and Efficient
Buildings and Cities

GRADIS
*A new era
of smart lighting*



Poland
Smart Electric Grid

111
Early start-ups
supported

55
New companies
created

More than
20
million euros
of external
investment raised

1292
Business ideas
captured

Game changers

“We need to invest more in green power”



Gregory Kotsis,
MSc SENSE
Project engineer at IREC
Barcelona

“Long-term vision is the key to the future”



Roberta Cirillo,
MSc EMINE
Research engineer, CEA
Grenoble

“Versatility, entrepreneurship and international experience”



Joeri Siborgs,
MSc Energy for Smart Cities
R&D project engineer,
Elia Brussels

280

Graduates from the
KIC InnoEnergy
Master’s School

8000

Applicants to
KIC InnoEnergy
Master’s School

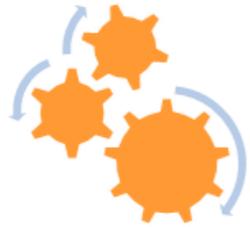
93%

Graduates who find
a job within six months
of graduating

15%

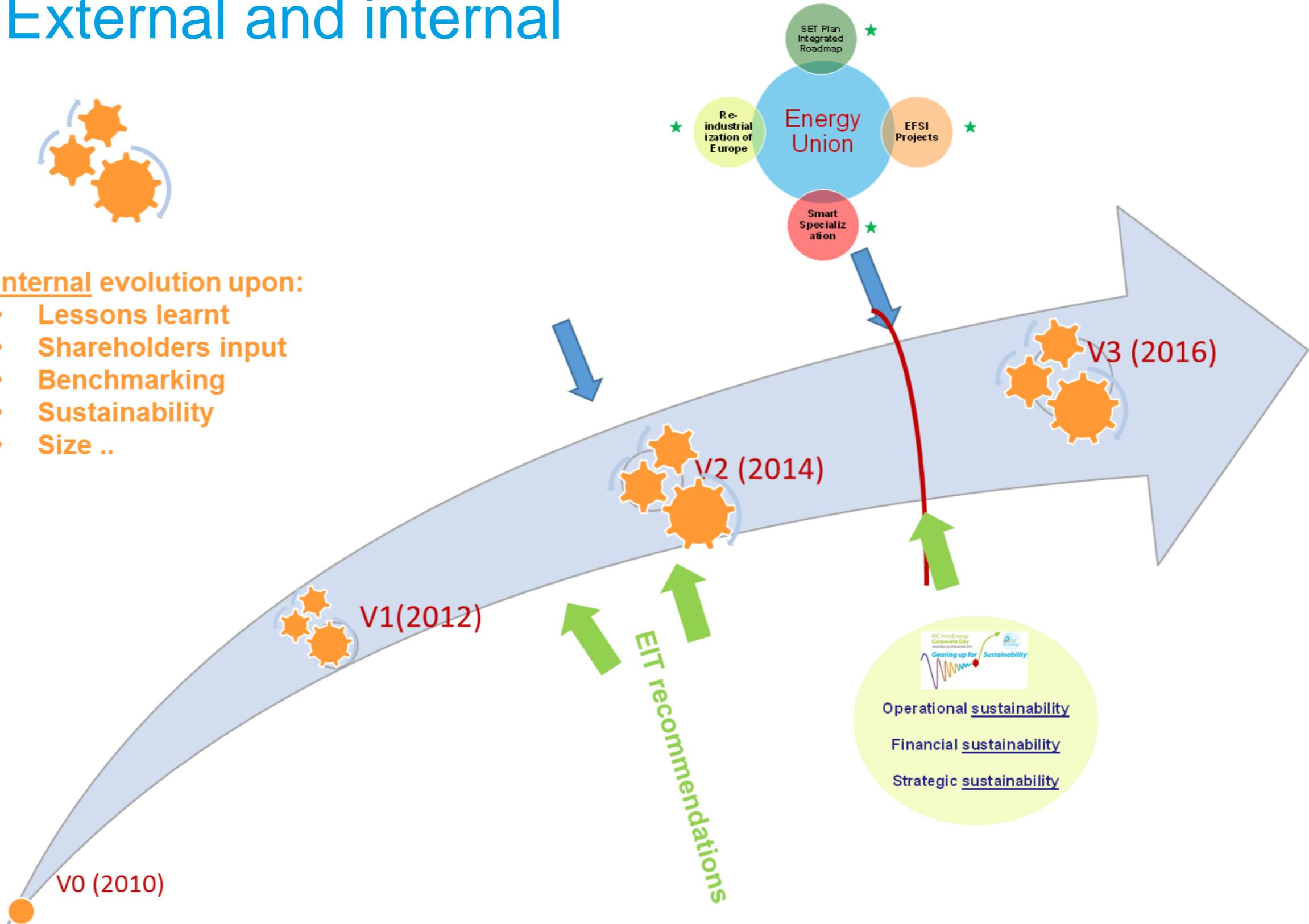
Average annual
salary earnings
over graduates
of similar programmes

External and internal

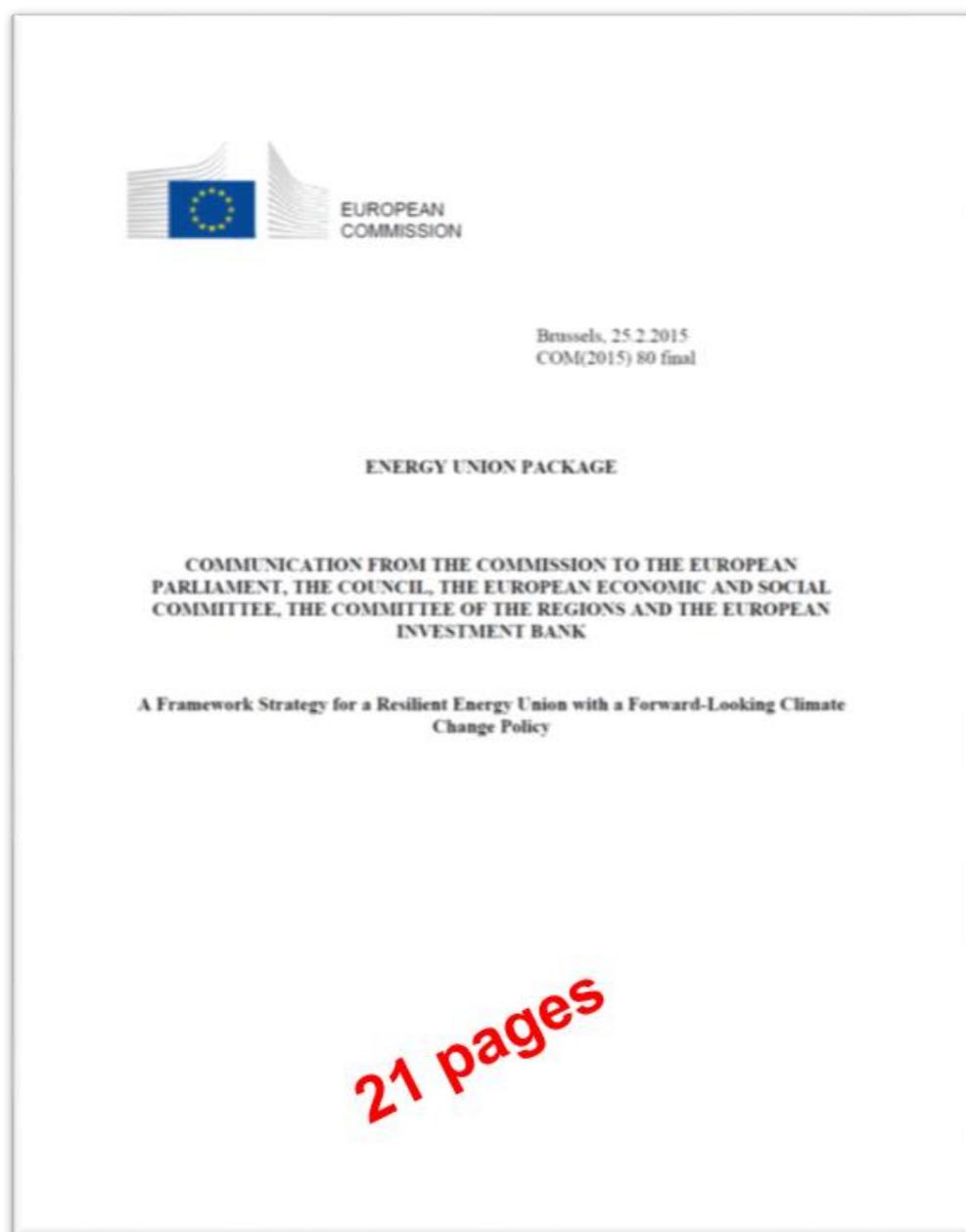


Internal evolution upon:

- Lessons learnt
- Shareholders input
- Benchmarking
- Sustainability
- Size ..



A clearly defined framework

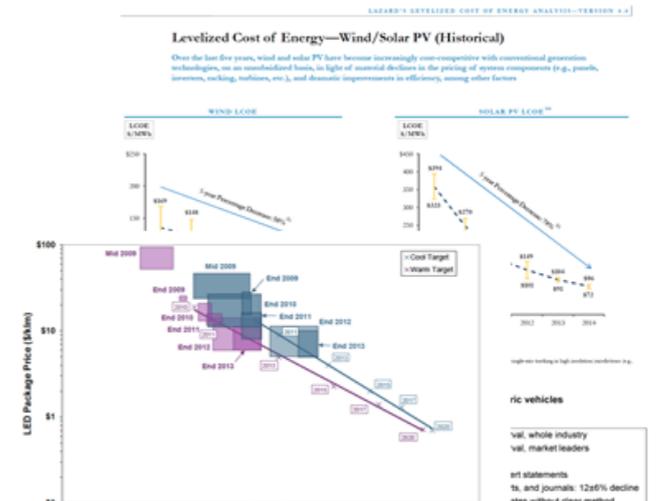


Our strategic view, pitched everywhere

FINANCIAL TIMES
Last updated: June 6, 2015 14:26
G7 leaders agree to phase out fossil fuels
Peter Clark in London and Stefan Wagener in Bonn



Government.no
Government Pension Fund Global
Climate criterion for the inclusion of companies from the Government Pension Fund Global (GPF)
Helse | Publisert: 2015-04-10 | Nr: 002015
Government will introduce a new criterion to exclude companies whose conduct to an unacceptable degree entail inhouse gas emissions. Together with a strengthening of the ownership, this represents a responsible investment choice that pays due heed to both the ethical and the social aspects of climate change, within the role of the GPF as a financial investor, says the Minister of Finance, Siv Jensen.



Levelized Cost of Energy—Wind/Solar PV (Historical)
Over the last five years, wind and solar PV have become increasingly cost-competitive with conventional generation technologies, on an unsubsidized basis, in light of material declines in the pricing of system components (e.g., panels, inverters, cabling, turbines, etc.), and dramatic improvements in efficiency, among other factors.

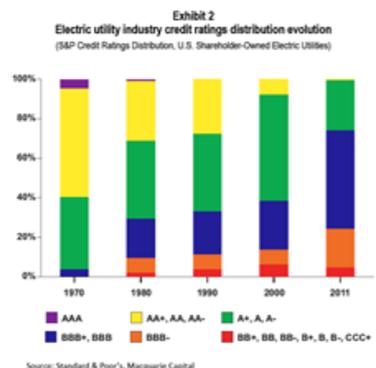
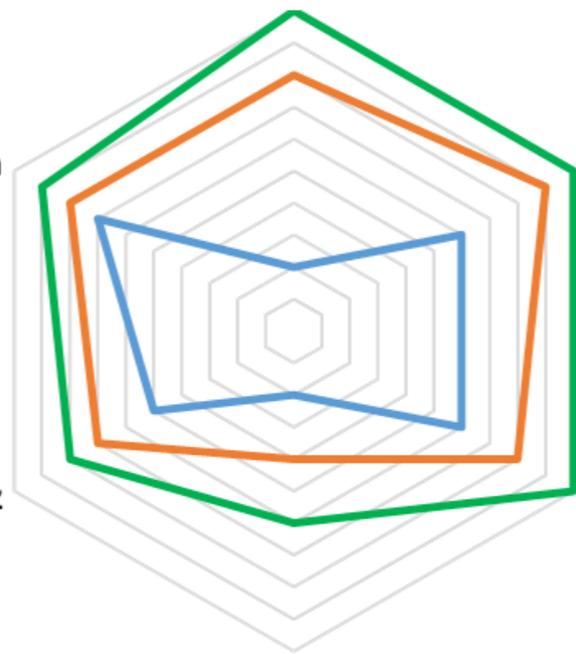
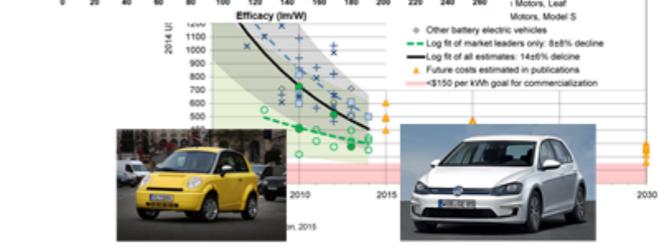


Exhibit 2
Electric utility industry credit ratings distribution evolution
(S&P Credit Ratings Distribution, U.S. Shareholder-Owned Electric Utilities)



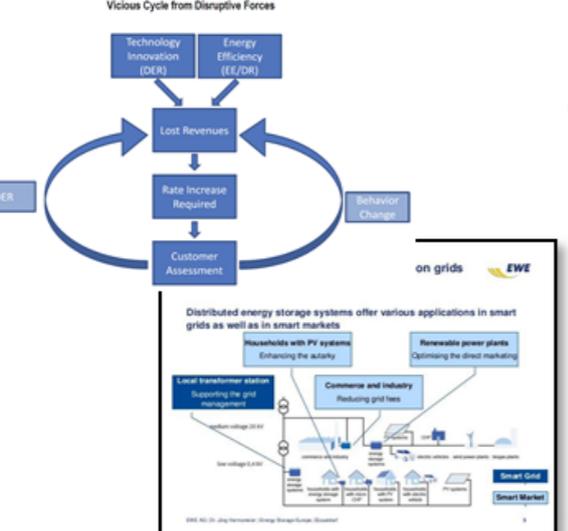


Efficacy (lm/W)
LED Package Price (\$/kWh)
Efficacy (lm/W)

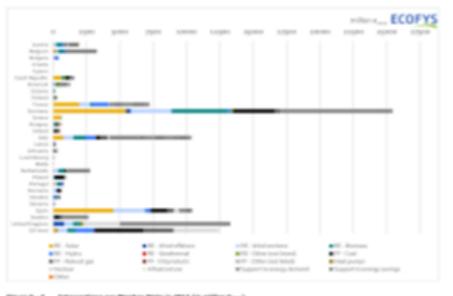


Think City 2009
Platser: 2
Längd: 314 cm
Max Hast: 113 km/h
0-100km/h: 16 s.
Räckvidd: 161 km
Effekt: 34kW (46hk)
Utrustning: Ej AC, Ej servo, direkt elvärme, ingen aktiv säkerhet...

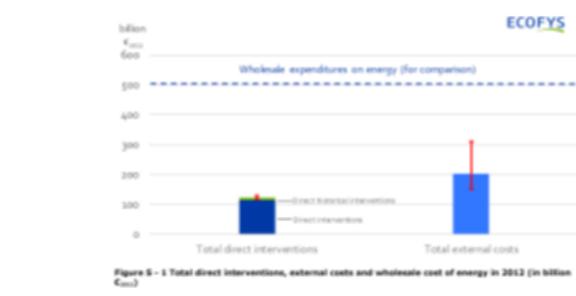
VW e-Golf 2014
Platser: 5
Längd: 425 cm
Max Hast: 140 km/h
0-100km/h: 10 s.
Räckvidd: 190 km
Effekt: 85 kW (115hk)
Utrustning: AC, aktiv säkerhet,...



Vicious Cycle from Disruptive Forces
Technology Innovation (DER) / Energy Efficiency (EE/DR)
Lost Revenues
Rate Increase Required
Customer Assessment
Behavior Change



ECOFYS
Wholesale expenditures on energy (for comparison)
Total direct interventions
Total external costs



ECOFYS
Wholesale expenditures on energy (for comparison)
Total direct interventions
Total external costs





The Extension of our Business Models

