

Energy efficiency in industrial processes (EEIP)

Petter E. Røkke, Joint Programme Coordinator
SINTEF

www.eera-set.eu



EERA is an official part of
the EU SET-Plan.

<http://setis.ec.europa.eu/>

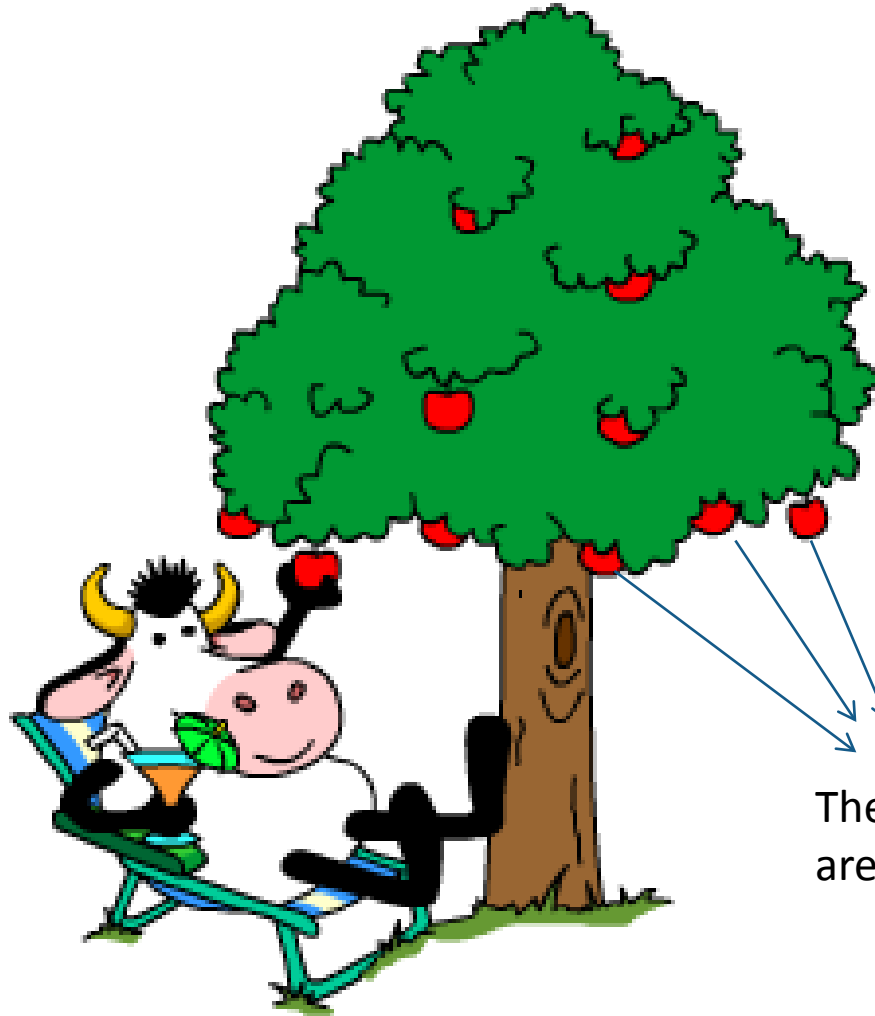
Agenda

10:00 – 10:20	<p>EERA JP Energy Efficiency in Industrial Processes</p> <ul style="list-style-type: none"> • Objectives • Progress • SET Plan Input paper 	Petter Røkke, JPC, SINTEF
10:20 – 10:40	<p>Presentation of SET Plan Declaration of Intent within Energy efficiency in Industry</p>	Eric Lecomte, EC DG ENER
10:40 – 12:00	<p>Discussion</p> <ul style="list-style-type: none"> • Input from industrial associated partners • EERA partner comments • Further process and involvement 	
12:00 – 12:45	Lunch	
12:45 – 13:05	<p>Presentation of European Energy Efficiency Platform (E3P)</p>	Isabella Maschio, JRC/EC
13:05 – 13:30	<p>Discussion</p> <ul style="list-style-type: none"> • Involvement of academic and R&D institutes in E3P establishment • Partner comments • Further process 	
13:30 – 14:00	<p>New Centre for Environmental friendly Energy Research - HighEFF</p>	Ingrid Camilla Claussen, SINTEF
14:00 – 15:00	<p>New projects and initiatives within EERA JP EEIP</p>	All

Points for discussion

- Reminder – Objectives for JP Energy Efficiency in Industrial Processes
- Progress 2015-2016
- SET plan input

Energy efficiency measures – low hanging fruits?



The lowest hanging fruits are also the cheapest...

Energy efficiency measures – low hanging fruits?

■ A lot has been done

- Waste heat utilisation
- Process integration
- Optimized manufacturing processes
- Local energy systems development
- Environmental friendly reductants (biocarbon...)

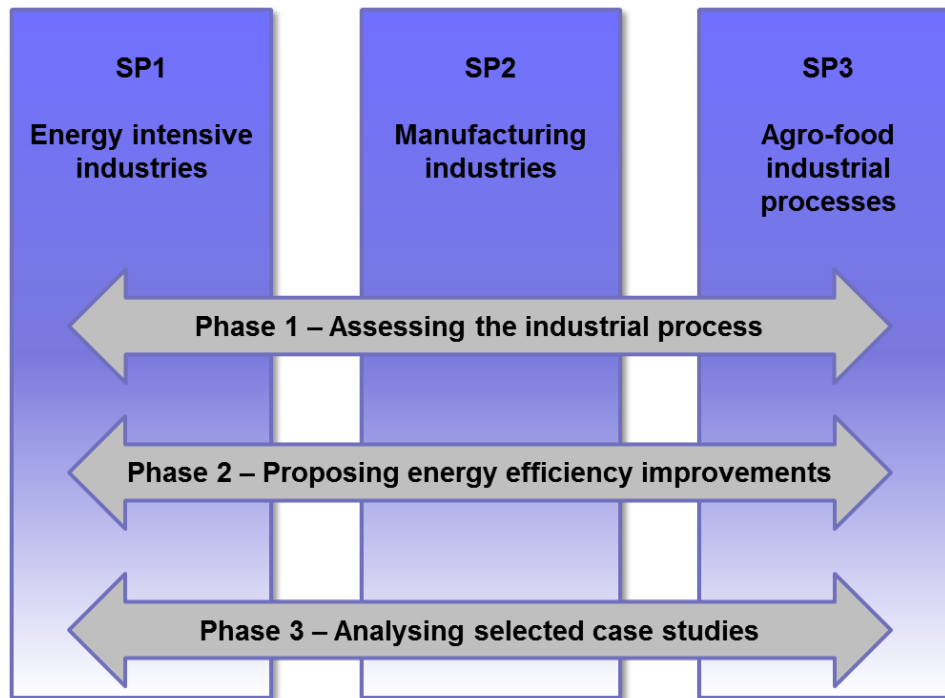


■ But even if the "high" hanging fruits are hard to get – higher energy efficiency still has the potential to make an significantly reduced environmental impact

- Large investments
- Longer time to return of investment
- Poor business case
- Industry is "cash driven"

How to collect the "high hanging fruits" ...?

- Cross sectorial approach
- The EERA JP EEIP way;



Vision and objectives

- 1) ...assessing the existing industrial processes within the sectors selected with the intention to contribute to a implementation of more efficient technologies and solutions (partially or completely, depending on the case);
- 2) ...proposing advanced concepts and designs to reduce energy consumption, operation and maintenance costs, to improve the environmental footprint, the characteristics and the amount of the products being equal or improved;
- 3) ...verifying the viability and the affordability of proposed solutions through concrete demonstration projects.

EERA JP EEIP in numbers – our "task force"

- 24 R&D institutes
- 11 countries
- Committed workforce ~130 py/y
- Complement the work of industry lead initiatives in research activities on EE (such as SPIRE, FoF...) by focusing in activities with lower TRL
- Opening access to infrastructures across Europe and joining forces of the best institutes

2015-2016

Some points from the annual report;

- Kick off meeting in Amsterdam 23rd June 2015
- JP workshop in Rimini/Bologna 4th and 5th November 2015 – including public seminar at ECOMONDO
- Presentation/panelist at EERA congress April 2015
- Presentation at EUSEW 2015 "Energy efficiency in agri-business"
- Panelist at EERA annual reception April 2016
- Contribution as stakeholder in SET plan revision process
- Project initiatives (e.g. LCE33 call – ECRIA)

SET plan process

Action 6; Continue efforts to make EU industry less energy intensive and more competitive

■ Draft Issues paper on key action 6 published January 2016

Sector	Final energy consumption	EE Economic potential (payback <=5 year)	EE Technical Potential	Energy cost/ Value Added	No. of employed	Value added, gross
	Mtoe	Mtoe	Mtoe		Million	€ billion
Pulp and paper	34.3	1.4	7.2	16%	1.43	79.0
Iron and steel	50.8	3.1	16.3	36%	0.63	39.7
Non-metallic mineral	34.2	1.3	7.1	23%	1.29	63.9
Chemical and pharmaceutical	51.5	3.2	16.5	12%	1.72	229.8
Non-ferrous metal	9.4	0.5	1.9	23%	0.46	23.7
Petroleum refineries	44.7	1.9	10.6	44%	0.12	24.3
Food and beverage	28.4	1.7	6.8	10%	4.53	251.4
Machinery	19.3	1.3	5.3	3%	9.03	579.8
Total	272.5	14.4	71.7			

SET plan process

Action 6; Continue efforts to make EU industry less energy intensive and more competitive

■ Draft Issues paper on key action 6 published January 2016

Priorities	Targets	Indicators
Sector specific R&I: Increasing the energy efficiency of our most energy consuming industries by increasing the cost effectiveness of existing technologies	<i>By 2030, the energy saving potential related to economically viable technologies (i.e. payback not longer than 5 years) is increased by 30% compared to the potential identified in 2015</i>	<i>Economic energy savings potential (payback not longer than 5 years)</i>
Sector specific R&I: Increasing the energy efficiency of our most energy consuming industries by progressing emerging technologies	<i>By 2030, 1/3 of the currently promising emerging technologies are becoming commercially available</i>	<i>R&I Maturity progress (lab, pilot, demonstration)</i>
Cross-cutting R&I: maximising the economic returns of waste heat recovery	<i>By 2025, develop and demonstrate waste heat recovery solutions (heat exchanger, storage, distribution, and industrial symbiosis)</i>	<i>Evolution of BAT for heat recovery (IED), monitoring of industrial excess heat</i>
Cross-cutting R&I: maximising the economic returns of high-efficiency components.	<i>By 2025, improve energy performance of components by 15%</i>	<i>Minimum energy performance standards for relevant industrial products (EcoDesign Directive) / evolution of BAT (IED)</i>
Cross-cutting R&I: Enhancing operational improvements with ICT and intelligent operating systems	<i>By 2020, cost-effective continuous process optimisation technologies help small and large industries reduce their energy consumption by 15%</i>	<i>% of savings related to operational improvements</i>

SET plan process

Action 6; Continue efforts to make EU industry less energy intensive and more competitive

- EERA submitted an input paper as response 15th Feb
 - some key points from EERA;
 - *"To realize the full potential and to achieve the expected impact of energy efficiency there should not be a limitation to three sectors."*
 - *"The ambitions of the SET plan could also be higher... <...> ...our understanding is that industry itself even has higher ambitions and targets than what is stated in the drafted Issues paper."*
 - Strengthen cross sectorial collaboration efforts, transnational efforts – e.g. ERA-NET, ECRIA

SET plan process

Action 6; Continue efforts to make EU industry less energy intensive and more competitive

- Stakeholder meeting + SET plan SG meeting
- A final declaration of intent completed and approved by the SET plan SG by end of April
- The process and involvement from stakeholders (including EERA) particularly on Action 6 has been highly acknowledged by SET plan and EC representatives

SET plan process

Action 6; Continue efforts to make EU industry less energy intensive and more competitive

— Temporary Working Groups for identification of implementation activities to realize priorities – ongoing!

— Member state involvement in process...

— ...more information in next presentation

SET Plan Action 6 - Energy Efficiency in Industry		Stakeholder -- Implementation proposal		
	Organisation name	Contact - first name	Contact - last name	Contact - email
	EERA - European Energy Research Alliance, Joint Programme Energy Efficiency in Industrial Processes (EEIP)	Petter	Rokke	petter.a.rokke@setnet.no
Priorities	R&I Targets	Interest	Interest in Joint R&I projects or programmes	Proposed new implementation action(s) or on-going programme or flagship project (or action from the integrated roadmap)
		High/Medium/Low	type "Y" or "N"	please describe action/programme (including also, if available, programme partners, timeline, budgets, funding)
1A. Iron & Steel sector: Increasing the energy efficiency of our most energy consuming industries by increasing the cost effectiveness of not yet economically viable technologies (TRL=7) through technological development, while striving to reduce GHG emissions proportionally	By 2030, at least 1/3 of the technical potential energy savings related to sector-specific technologies, identified for Iron & Steel, become economically viable (Payback <= 3 years)	High/Medium	Y	EEA is mostly focusing on TRL2-5 activities and will for this priority seek joint actions with large industrial stakeholders where R&D institutes can contribute with knowledge and infrastructure to support higher TRL development. Establishment of national centres of excellence within the topic, and international cooperation between these , will enhance the momentum towards implementation of technologies. The Norwegian national centre for research based innovation "RI Metal production" is an example of such a Flagship project. The centre is run by SINTEF and NTNU and gathers all metal producers in Norway. The centre has an extensive international scientific network (Australia, South Africa, Brazil, Germany). Joint actions among member states along with EU incentives or funding programmes is recommended.
2A. Iron & Steel sector: Increasing the energy efficiency of our most energy consuming industries by progressing emerging technologies (TRL 4 to 6), while striving to reduce GHG emissions proportionally	By 2030, 1/3 of the currently promising emerging technologies are successfully demonstrated at large scale (TRL=8)	High	Y	H2020 covers the TRL levels mentioned (4-6) and particularly actions such as the LCE33 call (ECRIA) will increase the possibility of aligning national actions already ongoing and thus giving a larger impact on an European basis, also for taking forward emerging technologies. An example of a flagship programme is the Norwegian research center for solar cell technology which plays an important role in bridging the gap between the fundamental research and the more applied activities covered in the Horizon 2020 programs.
1B. Chemical & Pharma sector: Increasing the energy efficiency of our most energy consuming industries by increasing the cost effectiveness of not yet economically viable technologies (TRL=7) through technological development, while striving to reduce GHG emissions proportionally	By 2030, at least 1/3 of the technical potential energy savings related to sector-specific technologies, identified for Chemical & Pharmaceutical, become economically viable (Payback <= 3 years)	High/Medium	Y	EEA is mostly focusing on TRL2-5 activities and will for this priority seek joint actions with large industrial stakeholders where R&D institutes can contribute with knowledge and infrastructure to support higher TRL development. Establishment of national centres of excellence within the topic will enhance the momentum towards implementation of technologies.
2B. Chemical & Pharma sector: Increasing the energy efficiency of our most energy consuming industries by progressing emerging technologies (TRL 4 to 6), while striving to reduce GHG emissions proportionally	By 2030, 1/3 of the currently promising emerging technologies are successfully demonstrated at large scale (TRL=8)	High	Y	H2020 programs cover the TRL levels mentioned (4-6) and particularly actions such as the LCE33 call (ECRIA) will increase the possibility of aligning national actions already ongoing and thus giving a larger impact on an European basis. As this sector are covering several unmaturing technologies and unborn industries, more fundamental European programs with lower TRL are needed.
3 Cross-cutting R&I: maximising the recovery of industrial excess heat/cold in a cost efficient manner	By 2025, develop and demonstrate (to TRL 8) cost effective excess heat/cold recovery solutions (e.g. heat exchangers, upgrade to higher temperature, storage, distribution, heat-to-power, heat-to-cold, power-to-heat)	High	Y	On this issue there is currently a wide range of technologies available but also new solutions that may, both on short and long term, contribute to more efficient heat utilization in industrial processes. The partners of EEIP have the knowledge and infrastructure for bringing forward ideas and concepts that is required for maximising the recovery of energy from industrial processes. Member state commitment and funding schemes to align efforts performed nationally is important and coordination actions from EU will strengthen the international implementation.
4 Cross-cutting R&I: maximising the energy efficiency of cross-sector industrial components in a cost efficient manner	By 2025, develop and demonstrate (to TRL 8) industrial components whose losses are reduced by 15% (e.g. boilers, dryers, pumps, compressors, fans, conveyors ... all of which systems typically contain motors and drives)	High	Y	The industrial side typically have excess heat streams at various temperatures and thus required various technologies for utilising the waste heat, but several of the components within such systems are similar and are based on detailed process knowledge - such as among the R&D environments within EERA. The current ERA-NET call within Energy efficiency is important for the implementation of this priority.
5 Cross-cutting R&I: Improving system integration, optimal design, intelligent and flexible operation, including industrial symbiosis, to increase energy and resource efficiency while striving to reduce GHG emissions	By 2025, develop and demonstrate solutions enabling small and large industries to reduce their energy consumption by 20% while striving to reduce GHG emissions proportionally	High	Y	Again, alignment of large national activities is important. Instruments such as the LCE33 call (ECRIA) should be strengthened with clear expectations towards coordination among member states and the major actors in Europe. Alignment across topics such as for instance CCS, Energy efficiency, Biorefinery etc., will strengthen the implementation of this priority.

Agenda

10:00 – 10:20	<p>EERA JP Energy Efficiency in Industrial Processes</p> <ul style="list-style-type: none"> • Objectives • Progress • SET Plan Input paper 	Petter Røkke, JPC, SINTEF
10:20 – 10:40	<p>Presentation of SET Plan Declaration of Intent within Energy efficiency in Industry</p>	Eric Lecomte, EC DG ENER
10:40 – 12:00	<p>Discussion</p> <ul style="list-style-type: none"> • Input from industrial associated partners • EERA partner comments • Further process and involvement 	
12:00 – 12:45	Lunch	
12:45 – 13:05	<p>Presentation of European Energy Efficiency Platform (E3P)</p>	Isabella Maschio, JRC/EC
13:05 – 13:30	<p>Discussion</p> <ul style="list-style-type: none"> • Involvement of academic and R&D institutes in E3P establishment • Partner comments • Further process 	
13:30 – 14:00	<p>New Centre for Environmental friendly Energy Research - HighEFF</p>	Ingrid Camilla Claussen, SINTEF
14:00 – 15:00	<p>New projects and initiatives within EERA JP EEIP</p>	All

Thank you!

Petter E. Røkke, SINTEF
petter.e.rokke@sintef.no
+47 90120221

