IEA 4E PECTA – An Energy Efficiency initiative of the International Energy Agency (IEA)

Silicon Carbide Event at Kista 2022-11-23

Peter Bennich, The Swedish Energy Agency
GDP Globally 1970 – 2021 [Relative scale]
Global energy mix 1800 – 2021
1950 and on: The Great Acceleration

Global primary energy consumption by source
Primary energy is calculated based on the 'substitution method' which takes account of the inefficiencies in fossil fuel production by converting non-fossil energy into the energy inputs required if they had the same conversion losses as fossil fuels.

Source: Our World in Data based on Vaclav Smil (2017) and BP Statistical Review of World Energy
OurWorldInData.org/energy • CC BY
Global energy mix 1970 - 2021

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The CO₂-budget is shrinking fast

Harsh message: Only 289 Gt CO₂ left in the budget, emissions ca 42 GtCO₂/yr -> ca 7 years left with the current emission rate… 36 ton/capita!

Källa: Remaining carbon budget - Mercator Research Institute on Global Commons and Climate Change (MCC) (mcc-berlin.net) [Nedladdad 22-09-13]
Material use 1970-2019
Critical questions

1. Is it really possible to achieve de-coupling between GDP-growth and the use of energy and material (often forgotten)?
2. If yes: how fast can it go, given the remaining CO₂-budget? Only very short time to go!
3. If no: what to do… but to decrease the consumption dramatically? Politically very very sensitive…
The global policy response

1. Assumes it *is* possible to achieve de-coupling between GDP-growth and the use of energy and material

2. *Energy efficiency* absolute critical to achieve that – ”Energy efficiency first” (EU, IEA)

3. But also efficient use of materials and other resources:
   – Hence Resource efficiency and Circular economy more in focus now

4. Inverter technologies one of the areas of interest!
IEA 4E PECTA – Power Electronics Conversion Technology Annex

An international policy collaboration focusing on promoting WBG
Introduction / Overview - Why is Power electronics of interest?

Power Electronic is everywhere and its efficiency is most relevant.
IEA 4E PECTA, The Power Electronic Conversion Technology Annex

- PECTA: Power Electronic Conversion Technology Annex
- One of four Annexes under the IEA 4E program
- Four Countries are currently active member (CH, AT, SWE, DK)

- PECTA in Sweden:
  - Experts from KTH, LiU and LNU
  - The Swedish Energy Agency
  - Swedish PECTA homepage!

IEA link: https://pecta.iea-4e.org/
Swedish link: https://www.kth.se/pecta
Overall Goal of PECTA

- *Collecting and analysing* information on new WBG-based power electronics as energy efficient technology, share expertise and pool resources on this energy efficient technology;

- *Coordinating internationally acceptable government approaches* that promote the WBG-based power electronics as energy efficient technology;

- *Developing greater understanding and promote government actions* that encourage the use of the WBG-based power electronics as energy efficient technology. Evidence based policy recommendations shall be included;

- *Accompanying and supporting international standardization* public organizations (specifically IEC) in providing neutral and independent inputs and views of technical aspects to help develop a global standard.
IEA 4E PECTA – Current Tasks

Task A: Completion and Updating available efficiency figures
- Task leader: Makoschitz Markus
- Country supporter: Diaz Adriana
- Task team: to be defined (probably with external consultant)

Task B: Energy and environmental related life Cycle Assessment
- Task leader: Diaz Adriana
- Country supporter: Diaz Adriana
- Task team: to be defined

Task C: Revision of elaborated Application Readiness Map
- Task leader: Makoschitz Markus
- Country supporter: Diaz Adriana
- Task team: to be defined

Task D: Policy measures and mapping with applications over timeline
- Task leader: Andersen Jakob / Bennich Peter
- Country supporter: Andersen Jakob (Bennich Peter)
- Task team: Experts to be confirmed by Denmark

Task E: Standards to support the WBG - Adoption
- JEDEC part:
  - Task leader: Grosner Ulrike
  - Country supporter: Brueniger Roland
- IEC part:
  - Task leader: to be defined
  - Country supporter: to be defined
  - Team: to be defined

Task F: Measurement of Power Supply Efficiency
- Task leader: to be defined
- Country supporter: Brüniger Roland
- Task team:
  - to be defined (probably with University)
  - including AIT (Austria)
  - including Swedish Energy Agency (Sweden)
PECTA’s role with key sectors
PECTA, The Power Electronic Conversion Technology Annex

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https://pecta.iea-4e.org/news/pecta-phase-1-report