Workshop on Pathways to Effectively Decarbonizing Industry
in the framework of the eighth session of the Group of Experts on Energy Efficiency
Geneva and online, 20 September 2021, from 4.30 to 6.00 p.m. (16:30 to 18:00) CEST

Are we ready? Pathways to net-zero manufacturing

featuring: Kerstin Kohler (SICK AG) ○ Francisco Alanis (Advisian) ○ Branko Dunjic (Cleaner Production Centre of Serbia) ○ Michael Heinze (INTENSE AG) ○ Hannes MacNulty (Green Industry Platform) ○ Iva Brkic (Carbon Neutrality Project) ○ Stefan M. Buettner (Task Force Industrial Energy Efficiency & EEP)
Workshop on Pathways to Effectively Decarbonizing Industry

1. Setting the Scene: Striving for net zero, but why?
2. Decarbonization pathways: The company perspective
4. Decarbonizing carbon intensive industries
5. Q&A
6. Wrap-up, conclusions and next steps
Striving for net zero, but why?

Opening & Setting the Scene

Stefan M. Buettner
Societal expectations are rising

Why strive for net zero now?

EU €750 billion Covid recovery fund comes with green conditions

Published on 27/05/2020, 2:37pm

A quarter of spending has been earmarked for climate action and a ‘do no harm’ clause rules out environmentally damaging investments

The New York Times

Big Business Says It Will Tackle Climate Change, but Not How or When

In Davos, business leaders were newly vocal about the danger, though they gave few details about how they would reform their practices.

edie

Disclose climate risks or face divestment, investors warn Europe’s largest companies

17 November 2020, source edie newsroom

A coalition of investors representing more than $9trn of assets has asked some of Europe’s largest and highest-emitting companies, like Shell and Maersk, to prove they are aligning with the Paris Agreement and to improve climate risk disclosure.

Climate change: How a green new deal really could go global

BBC NEWS

Trade unions around the world support global climate strike

Adults, businesses and trade unions asked to join youth climate campaign

Finance

Long-Term Investors Now Hold Sway Over ESG

Investors are having more success on climate change, and increasingly are pushing companies on human rights, diversity and pay equity.
What are the implications for my company?
**Why strive for net zero now?**

**What are the implications for my company?**

Expected increase in cost of energy-related emissions (excluding electricity)

<table>
<thead>
<tr>
<th>Company size</th>
<th>Energy consumption (non-electricity)</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>Based on damage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>634 MWh</td>
<td>25 €</td>
<td>30 €</td>
<td>35 €</td>
<td>45 €</td>
<td>55 €</td>
<td>55-65 €</td>
<td>180 €</td>
</tr>
<tr>
<td>Medium</td>
<td>13.5 GWh</td>
<td>7,200 €</td>
<td>8,700 €</td>
<td>10,000 €</td>
<td>13,000 €</td>
<td>15,900 €</td>
<td>18,750 €</td>
<td>52,000 €</td>
</tr>
<tr>
<td>Large</td>
<td>7.5 TWh</td>
<td>157,000 €</td>
<td>189,000 €</td>
<td>220,000 €</td>
<td>283,000 €</td>
<td>346,000 €</td>
<td>409,000 €</td>
<td>1.13 mil €</td>
</tr>
</tbody>
</table>

What options do you have?

- Accept additional costs at the expense of profit/margin/product prices
- Substitute energy sources for lower emissions (trade-off CO₂ price vs. additional cost tariff)
- Invest instead of paying the CO₂ price → reduction of the due levy by investing in emission, cost-reducing efficiency, process optimisation, and local energy generation

Source: Deutsches Global Compact Netzwerk 2018

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**CO₂ price (nEHS-scenario) €/tCO₂e**
What are the implications for my company?

Growing number of schemes and escalating emission prices

EU Emission Trading System (ETS)
- Rises rapidly with tightening of EU 2030 emissions targets
- Expansion to additional sectors under consideration (currently: electricity + selected industrial sectors)
- €65 price projection for 2030 is likely to be exceeded
- 50% increase in 6
- High uncertainty leads to difficulty in planning

DE-National Emissions Trading Scheme (nEHS)
- Energy-related emissions (excluding electricity)
- Established price plan until 2025/6 (court decision may change this)

*EU Commission ALLBNK Scenario, ETS last updated on 01/06/2021
Source: The World Bank, EU Commision, TradingView

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How do companies react?
Carbon neutrality announcements by companies

Assumed motivation, considerations, and benefits:

Case study: automotive industry supplier

- Demonstrate leadership and apply pressure on competitors (massive PR)
- Appear conscious to attract scarce skilled personnel/graduates
- Show being on top of the game/innovate to establish future-proof business in the disrupted automotive sector
- Impose pressure on their supply chain to deliver zero-carbon products
- Remain attractive to growing investors that abandon non-future-proof business models
- Create an economic sense:
  - Invest 2bn EUR over 11 years to have a total cost of 1bn EUR by 2030 (+ where applicable additional savings from avoided future CO₂-tax)
  - Vertical internalisation:
    - Disconnect early from the increasing costs and supply shocks → gain control over risks & costs
    - Reduce payments to "others" (general costs of energy)
  - Compensate remaining emissions by e.g., ‘scrappage bonus’ for own product range; using own technology in aid-based compensation projects
  - Gain energy productivity increase/competitiveness
  - Monetise the opportunity of showing others how to become net zero
How do German manufacturers react?

**LEFT:** 60% of companies aim for net-zero – 2/3rd by 2025 (preCOVID)

**RIGHT:** Companies intend to reduce emissions by ca. 23% by 2025

~50% of the **decarbonisation** over the next 30 years will occur **in the next 5 years**

Source: EEP Energieeffizienz-Index der deutschen Industrie 2019/II, -2020/I

~60% of the planned measures by 2025 are of a **local nature**

By what % do you plan to reduce your GHG emissions by 2025 (incl. compensation measures) (n=550)

- Micro company
  - 3%
  - 2%
  - 5%
  - 6%

- Small company
  - 5%
  - 3%
  - 3%
  - 6%

- Medium company
  - 5%
  - 3%
  - 3%
  - 5%

- Large company
  - 4%
  - 4%
  - 5%
  - 6%

~60% of the planned measures by 2025 are of a **local nature**

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Why should local measures be prioritised?

Boosting resilience in manufacturing

<table>
<thead>
<tr>
<th>On-site - direct footprint reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased energy and material efficiency and productivity</td>
</tr>
<tr>
<td>- Electricity</td>
</tr>
<tr>
<td>- Heat</td>
</tr>
<tr>
<td>- Cold</td>
</tr>
<tr>
<td>- Compressed air</td>
</tr>
<tr>
<td>Decentralised generation of renewable energies</td>
</tr>
<tr>
<td>Energy flexibility and storage</td>
</tr>
</tbody>
</table>

“On-site action is key to increase resilience against external shocks.”

“Energy Efficiency is not in competition with Green House Gas reduction – to the contrary, Energy Efficiency is an integral part of reducing the environmental footprint.”

SMB

<table>
<thead>
<tr>
<th>Off-site - indirect footprint reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase of renewable energies</td>
</tr>
<tr>
<td>Compensation measures</td>
</tr>
</tbody>
</table>

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Why should local measures be prioritised?

Economic factors could help with sequence:
How do the measures have a lasting effect on running costs?

Mix of Measures for the planned greenhouse gas reduction

- **Reduction:**
  - Reduction of energy demand reduces emissions
    - organizational optimizations/one-time investment required
    - running costs (energy) **decrease**
  - Process adaptation reduces emissions
    - one-time investment required
    - running costs (energy) **unchanged**

- **Substitution:**
  - Own production of renewable energies reduces emissions
    - but one-time investment required
    - running costs (energy) **decrease**
  - Change of energy source reduces emissions
    - Energy unit may cost more per unit, !availability!
    - running costs (energy) **increase slightly**

- **Compensation (or do nothing): Emissions still exist**
  - their compensation (or CO₂-price were applicable) costs permanently per unit
  - running costs (emissions) **increase**

Further developed according to ACEEEEEP Industrial Decarbonisation Considerations (2020)
Establishing clarity on the terminologies

Only a common understanding on targets allow reaching them effectively

**The New York Times**

*Japan’s New Leader Sets Ambitious Goal of Carbon Neutrality by 2050*

The announcement, coming weeks after a similar pledge by China, will require a major overhaul of the infrastructure in Japan, which remains heavily dependent on fossil fuels.

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**Reduction & compensation of:**

1. CO₂ emissions
2. CO₂ + non-fluorinated greenhouse gases (CH₄, N₂O) + fluorinated GHGs (HFC, PFC, SF₆, NF₃)
3. CO₂ + non-fluorinated GHGs + fluorinated GHGs + all other substances that negatively impact the environment and health e.g., particulate matter, soot, NOₓ, SO₂
What target dimension are companies working towards?
What is the target dimension?

More than 1 out of 2 companies optimise their energy demand and/or work on CO₂ emissions reduction; 10% don’t optimise

The EU has set a target to be climate neutral by 2050 and is currently revising the 2030 targets. What are you optimising your company towards - which of the following options apply to your company?

(n=834, n’=1663)

<table>
<thead>
<tr>
<th>Percentage of companies</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy demand optimisation</td>
<td>58%</td>
</tr>
<tr>
<td>CO₂ emissions reduction (incl. energy demand)</td>
<td>53%</td>
</tr>
<tr>
<td>GHG emissions reduction</td>
<td>36%</td>
</tr>
<tr>
<td>Reduction of all environmental impacts</td>
<td>36%</td>
</tr>
<tr>
<td>Optimisation not planned</td>
<td>10%</td>
</tr>
<tr>
<td>Do not know</td>
<td>4%</td>
</tr>
</tbody>
</table>

Source: EEP Energieeffizienz-Index der deutschen Industrie 2020/II
Where do we stand?
Knowledge of own CO₂ emissions are an important basis

Half of the companies are aware of their own emissions. Especially for energy-related emissions there is a need to catch up more quickly.

Are you aware of your company’s CO₂ emissions?

- **Process-related (n=829)**
  - Yes: 40%
  - No: 37%

- **Energy-related (n=831)**
  - Yes: 37%
  - No: 8%

- Yes, the CO₂ emissions for each site of our company are known.
- Yes, CO₂ emissions are known for the entire company.
- No, are not known because we do not know how to capture them.
- No, are not known, because the recording is too time-consuming.
- No, for other reasons.
# Awareness level savings potentials of cross-sectional technologies

The majority of companies have no knowledge about their energy saving potentials in the cross-sectional technologies used (exception: lighting)

<table>
<thead>
<tr>
<th>Technology</th>
<th>0%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressed Air</td>
<td>45%</td>
<td>17%</td>
<td>38%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump Systems</td>
<td>46%</td>
<td>21%</td>
<td>33%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling Systems</td>
<td>42%</td>
<td>32%</td>
<td>26%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat Supply</td>
<td>47%</td>
<td>19%</td>
<td>35%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation Systems</td>
<td>52%</td>
<td>26%</td>
<td>22%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Energy Efficiency Index of German Industry: 2021/1, EEP(2021) *with the same output/utilisation ratio, i.e. efficiency increase
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   2.2 Francisco Alanis (Advisian)


4. Decarbonizing carbon intensive industries

5. Q&A

6. Wrap-up, conclusions and next steps
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3 Panel discussion: Are we ready? Pathways to net-zero manufacturing

4 Decarbonizing carbon intensive industries

5 Q&A

6 Wrap-up, conclusions and next steps
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Panel discussion

Are we ready? Pathways to net-zero manufacturing

Moderator:

Hannes MacNulty
Senior Industry Advisor, Green Industry Platform, and Co-Chair, Task Force on Industrial Energy Efficiency

Panellists:

Ms Kerstin Kohler
Head of Environmental Management, SICK AG

Mr Francisco Alanis
Senior Consultant, Advisian (Worley)

Branko Dunjic
Director, Cleaner Production Centre of Serbia

Mr Michael Heinze
Board Member, INTENSE AG
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Energy intensity by company size

Being energy intensive is not limited to large companies

Source: Energy Efficiency Index of German Industry: 2021/1, EEP(2021)
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Mapping out the path to net-zero
Mapping out the path to net-zero

We need to know where we are for a realistic & effective roadmap

- How effective are current policies considered to facilitate an increase in energy efficiency in industry?

- What measures, if any, are being taken by companies to reduce their carbon footprint?

- Are energy, resource and carbon footprint being considered during product development?

- What GHG reduction do companies aim for within the next 5 years?

- Impact of Covid-19 on level of ambition and planned decarbonisation action
Ingredients to succeed

Understanding the sectors’ ambitions, plans and actions

This is where the *Energy Efficiency Barometer of Industry* comes in:

- Sheds light on the current realities in manufacturing across all company sizes, 27 manufacturing sectors and different energy intensities across Europe
- Attendees reaching out to their constituencies to aide gathering status quo evidence
- The EEBarometer covers 88 countries
  - outreach kit can be provided in 10 languages
  - outcomes will inform work of UN ECE TF Industry
Ingredients of net-zero pathways
## Mitigation measures

### Reduction

<table>
<thead>
<tr>
<th>Examples</th>
<th>Effects</th>
<th>Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery replacement for higher efficiency</td>
<td>One-off investments</td>
<td>Energy costs</td>
</tr>
<tr>
<td>Installation of heating control system</td>
<td></td>
<td>Energy-related emissions</td>
</tr>
<tr>
<td>Process-related emissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel production via DRI</td>
<td>One-off investments</td>
<td>Energy costs</td>
</tr>
<tr>
<td>3D printing</td>
<td></td>
<td>Operational costs</td>
</tr>
</tbody>
</table>

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20 September 2021

Fraunhofer IPA | University of Stuttgart
Institute for Energy Efficiency in Production EEP
## Mitigation measures

### 2 Substitution

<table>
<thead>
<tr>
<th>Self-generated renewable energy</th>
<th>Examples</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation of PV systems</td>
<td>Economic one-off</td>
<td>Energy costs</td>
</tr>
<tr>
<td>Waste heat recovery</td>
<td>One-off investments</td>
<td>Energy-related emissions</td>
</tr>
<tr>
<td>Purchase of renewable energy</td>
<td>Additional supporting systems e.g., energy storage, might be needed</td>
<td>Possibility of additional maintenance costs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Purchase of renewable energy</th>
<th>Examples</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable Energy Power Purchase Agreements (PPAs)</td>
<td>No one-off investments</td>
<td>Energy costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy-related emissions</td>
</tr>
</tbody>
</table>
## Mitigation measures

### Compensation

<table>
<thead>
<tr>
<th>Certificates/Projects</th>
<th>Examples</th>
<th>Effects</th>
<th>Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>▬ Purchase of carbon credits</td>
<td><img src="null" alt="✗" /> No one-off investments</td>
<td><img src="null" alt="▼" /> Additional company expenses</td>
<td><img src="null" alt="▼" /> Additional operating costs</td>
</tr>
<tr>
<td>▬ Worldwide green projects financing</td>
<td><img src="null" alt="✓" /> One-off investments</td>
<td><img src="null" alt="▼" /> No effect on energy costs</td>
<td><img src="null" alt="▼" /> No effect on energy costs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CO₂ storage, binding &amp; use</th>
<th>Examples</th>
<th>Effects</th>
<th>Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>▬ Carbon capture, utilisation, and storage (CCUS)</td>
<td><img src="null" alt="✓" /> One-off investments</td>
<td><img src="null" alt="▼" /> Net emissions</td>
<td><img src="null" alt="▼" /> Net emissions</td>
</tr>
</tbody>
</table>
Identifying the optimal mix of measures

Each puzzle differs

Your Focus
Your Situation
Your Priorities

Roadmapping
Communication
Workplace & Organization
Technology Leap
Flexibilization

Energy Efficiency
Resource Efficiency
Self Generation & Storage
Corporate Mobility
Sustainable Logistics
Compensation & CO₂ Capture

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20 September 2021
Thank You!

Dipl.-Volksw.

**Stefan M. Buettner**

*Director Global Strategy & Impact*

*Chair UNECE Task Force on Industrial Energy Efficiency*

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[Links to websites and social media accounts]