TRANSFORMERS MAGAZINE'S
INDUSTRY NAVIGATOR

SUSTAINABILITY AND DIGITALIZATION

Joint Industry Initiative on Sustainability

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Date 6 June 2023

Joint Industrial Project

Recommended Practice for
Decarbonization of High Voltage Industry
with a Focus on Power Transformers

Transmission & Distribution Technology Department

DNV at a Glance

A global assurance and risk management company

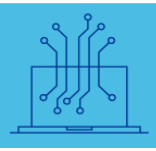
157	~12,000	100,000	100+	5% R&D
years	employees	customers	countries	of annual revenue

Ship and offshore classification and advisory

Energy advisory, certification, verification, inspection and monitoring

Management system certification, supply chain and product assurance

Software, platforms and digital solutions



The world's leading resource of independent energy experts

4000 experts
provide local access to global best practice delivering safe and effective energy systems

90+ years
serving the energy industry, including the oil and gas, wind and solar sectors

24
laboratories and test centres including facilities for full-scale testing

170
industry standards, guidelines and recommended practices, and approx. 30 joint industry projects per year

65%
of offshore pipelines designed and installed to DNV standards

42 GW
of real-time operational data from solar PV, wind and storage assets under management

>100
large power utility companies trust us as their technical advisor

World 1st
hydrogen full-scale testing facility supporting safety, infrastructure and policy

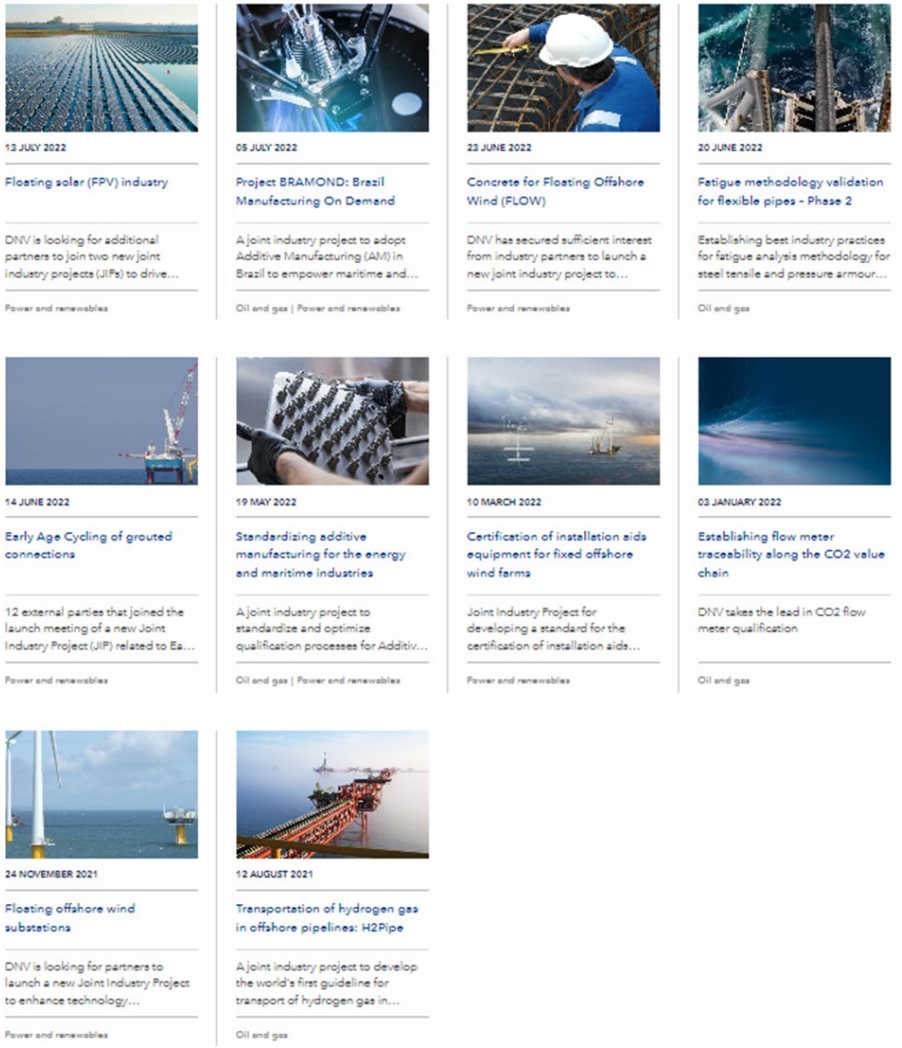
DNV JIPs

Example: Floating offshore wind substation

Participants: 25 contributors, including: TenneT, Statnett, Hitachi Power Grids, Siemens Energy, …

Purpose:
Identifying the gaps with regards to offshore floating substation and the development and efforts required to close the gap

Deliverables:
Report on key technologies to future substation development



Pathway to net zero emissions: Highlights

Pathway to net zero is technically and politically feasible – but only with strong policy implementation

To reach 1.5°C, leading regions and sectors have to go much further and faster – reaching net zero well before 2050

Renewable electricity, hydrogen, and bioenergy are essential, but insufficient carbon capture and removal play a critical role

Massive, early action is needed to have any chance of reaching 1.5°C – where time is the most critical constraint

Policies influence our Outlook & Pathway to net zero — in three main areas

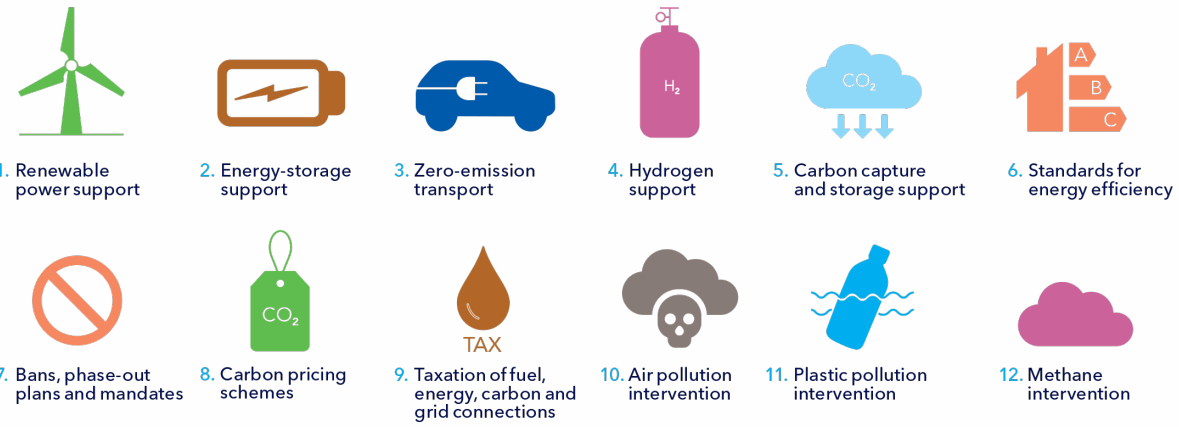
Supporting technology development and stimulating market uptake of clean technologies

Restricting the use of inefficient or polluting products/technologies by means of technology requirement or standards

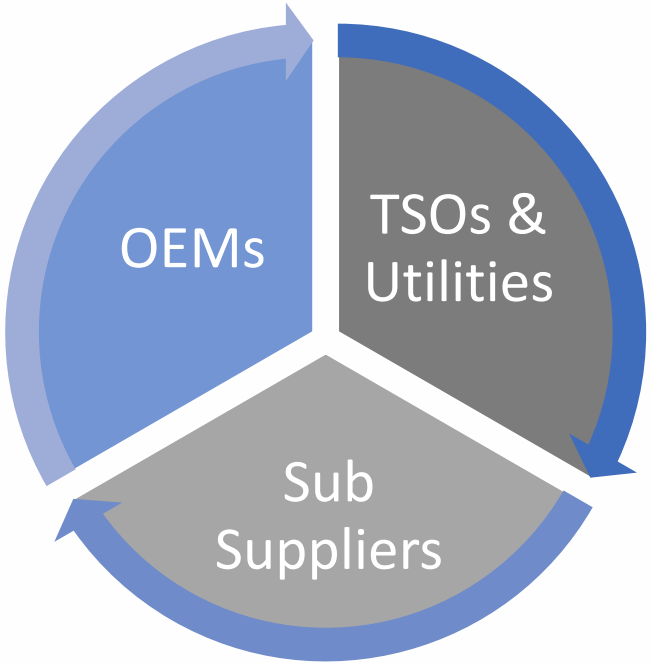
Providing economic signals to reduce carbon-intensive behaviors and encourage lower energy use

FIGURE 6.1

Policy factors included in our Outlook



Why does a High Voltage Power Transformer need best practices in sustainability?



Risks

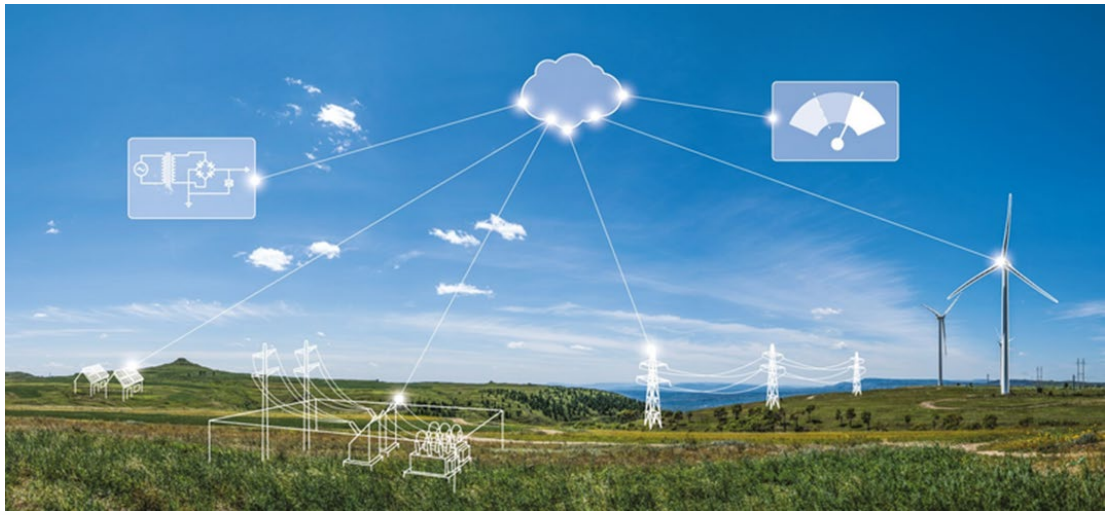
- SBT/COP commitments
- Lack of knowledge sharing and standard approaches
- Increase in timelines and decrease in appeal and trust
- Failure of green commitments

Value Proposition

- KNOWLEDGE SHARING
- STANDARDIZED BEST PRACTICES
- HIGHER QUALITY AND TRUST
- ACCOMPLISHMENT & CONSOLIDATED MARKET

Why

- Carbon price is already there in many fields.
- Transmission grid owner and developers require insight from manufacturers and suppliers into used materials and their CO_2 footprints.
- Lack of a standard approach causes efforts by all stakeholders that may lead to misinterpretations.
- DNV aims to gather relevant stakeholders to develop a standard approach towards decarbonization, life cycle assessment of the grid and specify the fields in which circular economy can be improved.
- In particular, power transformers represent ideal equipment to be the first.

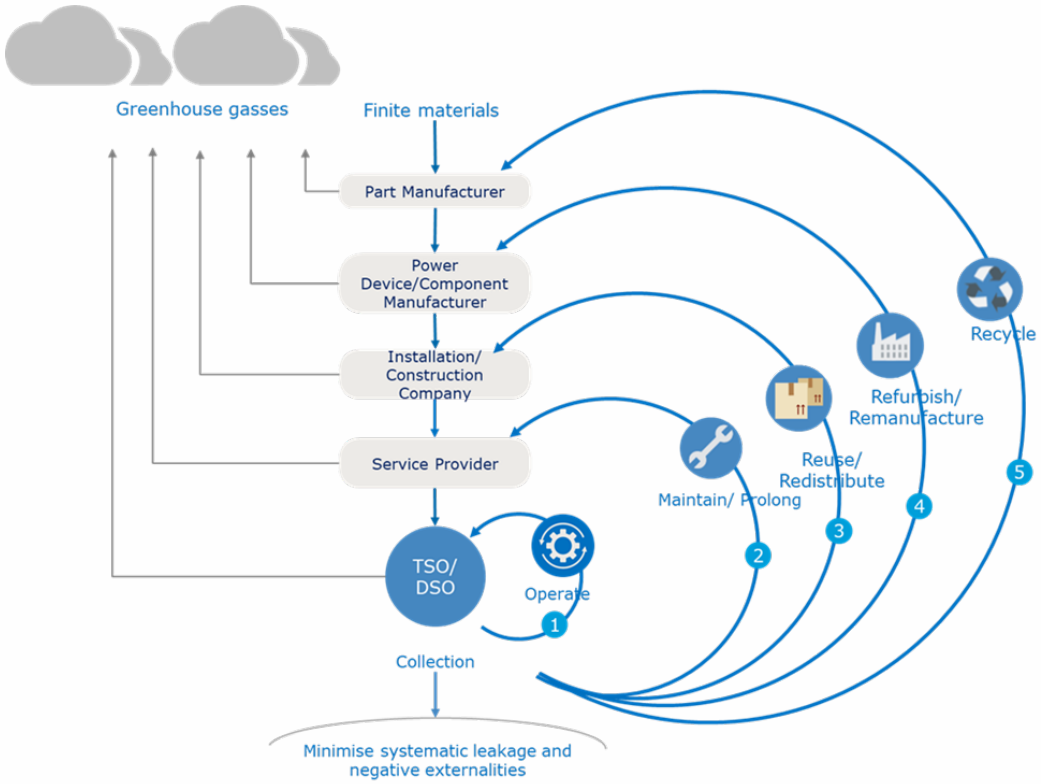


<100 EUR/tCO_2

Carbon prices will be regional and in 2050 range between $80-90/tCO2 (EU-ETS)

Other policy examples:
- Air pollution measures
- RE power support
- EV support
- Maritime environmental regulations

The four steps of life cycle assessment (LCA)



Scope definition & boundary

The first step in conducting an LCA is to define the goal and scope of the assessment. This involves identifying the purpose of the assessment, the system boundaries, and the functional unit of analysis. The functional unit is a quantifiable measure of the product or service being assessed, such as a unit of energy or a kilogram of material.

Life cycle inventory

The second step is to conduct a life cycle inventory (LCI), which involves identifying and quantifying all the inputs and outputs associated with the product or service over its entire life cycle. This includes raw material extraction, manufacturing, transportation, use, and end-of-life disposal.

Life cycle impact assessment

The third step is to conduct a life cycle impact assessment (LCIA), which involves evaluating the potential environmental and social impacts of the product or service over its entire life cycle. This includes impacts such as climate change, resource depletion, human toxicity, and ecosystem damage.

Interpretation

The final step is to interpret the results of the LCA and communicate them to stakeholders. This involves analyzing the LCI and LCIA results to identify hotspots or areas of significant impact, evaluating the effectiveness of different strategies for reducing environmental impacts, and making recommendations for improvement. It is important to communicate the results of the LCA clearly and accurately to stakeholders, including customers, investors, and policymakers, to inform decision-making and promote sustainable practices.

WP1 – scope definition and boundary

- Define the terminology
- Review available standards
- Select methodologies:
  - EU-taxonomy: The EU taxonomy is a classification system of "environmentally sustainable economic activities"
  - EPD: Environmental Product Declaration is a document which transparently communicates the environmental performance or impact of any product or material over its lifetime.
- Define the system boundary & process
  - Determine methodology based on the EN-ISO 14000 series, EN-ISO 14044/PAS 2050/GHG protocol or PEF/EN 15804
  - Clarify the life cycle stages
- Define the functional unit & reference flow
- Define the data quality requirement
- Select KPIs for monitoring

WP2 – Life cycle inventory and assessment

- Define standard steps in inventory of power transformers
  - Specify the main activity for each stage and relevant key performance indicators
  - Define inputs and outputs
- Define Standard level of LCA analysis
  - Present an arbitrary LCA of a power transformer using ISO 14067
- Define standard reporting (clarify inclusion and exclusion)

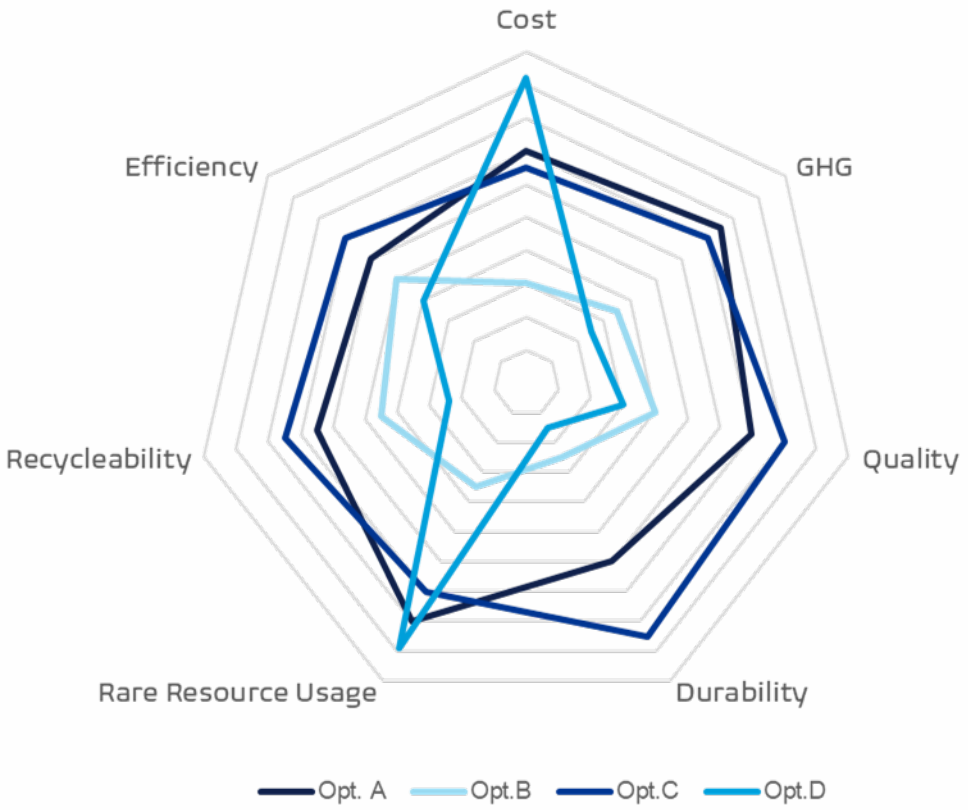
- Additional points on environmental product declaration, emissions, sources, recyclability, and activities.

WP3 – Interpretation and scoring

- Review the existing evaluation approaches, e.g., International Sustainability and Carbon Certification or QWERTY approach
- Score per KPI
- One Scoring and Weighting

The scoring will assure:

- Final commercial decision
- Greener technologies
- Crystal clear cost benefits



Summary of Work packages & Deliverables

Scope:

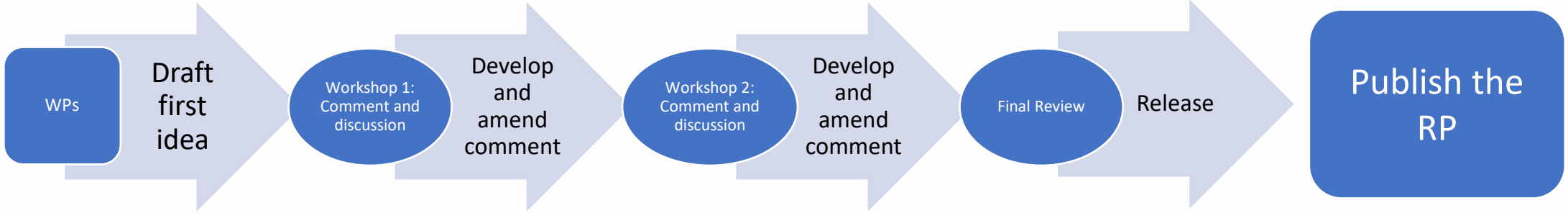
- Terminology definition
- Defining standards & methodologies
- Define boundaries and KPIs
- LCI & LCIA of power transformers
- Integration of different stages of LCAs
- Interpretation of scoring of relative results in an absolute way

Workshops and discussion with stakeholders

Deliverables:

- Recommended practice document including all agreed topics, parameters and templates
- Generic LCA analysis of a power transformer
- Standard template for material passport, EPD reporting

Planning



	2023							2024	
Task	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**January**	**February**
Kick-off									
WP1									
Workshop 1									
Workshop 2									
WP2									
Workshop 1									
Workshop 2									
WP3									
Workshop 1									
Workshop 2									
Final Review									
Publish									

JIP group aims to start in June and deliver the complete scope by early 2024

Let's discuss

Any questions?

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