Business plan for a DIN SPEC project according to the PAS procedure on

„Test methods for determining the energy efficiency of AI systems, taking both software and hardware into account “

Status:

For developing the DIN SPEC after adoption on 20.10.2025

Recipients of this business plan are requested to name all patent rights known to them to be relevant to the project and to make available all supporting documents.

Berlin, 31.3.2026 (Version 3)

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1 Status/version of the business plan

- **For public commenting (Version 1)**

  This business plan is intended to inform the public of a new DIN SPEC project. Any interested party can take part in this project and/or comment on this business plan. Please send any requests to participate or comments by e-mail to phuong-vy.elsesser@din.de.

  Once this business plan is published, the Chairman of DIN's Executive Board decides whether or not the project is to be carried out.

  If the project is accepted, all those who have applied for participation or have commented on the business plan by the deadline will be invited to the kick-off meeting of the project consortium.

- **For developing the DIN SPEC after adoption on 20.10.2025 (Version 2)**

  Changes to the previous version 2:

  Titel and scope

2 Initiator and other consortium members

- **Initiator:**

Person/Organization	Short description
David Kappel	David Kappel is Assistant Professor of Sustainable Artificial Intelligence (AI) at the Center of Excellence in Cognitive Interaction Technology (CITEC). His research focuses on the development and use of efficient AI. CITEC was founded at Bielefeld University in 2007 as part of the Excellence Initiative. With 24,000 students, Bielefeld University today comprises 14 faculties covering a wide range of subjects in the arts and humanities, natural sciences, engineering and medicine. In terms of research, UBI is among the top 25 percent of the national competitive field. Its research profile is based on four strategic, thematic research priorities, which are linked by three cross-cutting themes. The strategic research priorities concentrate on innovative basic research.

- **Other potential participants:**

  This DIN SPEC will be developed in a consortium (temporary body) that is open to any interested party. The participation of other experts would be helpful and is desired. It is recommended that

  – Economy/Industry/Services>
  – Provider of AI solutions
  – Developers of AI hardware & software

– Technical associations, VDI/VDE/VDMA
– etc.

take part in the development of this DIN SPEC.

- **Organizations**[Fehler! Textmarke nicht definiert.] **that have registered for participation**

Person	Organization
Jun.-Prof. Dr David Kappel	Universität Bielefeld
Dr. -Ing. Andreas Hantsch	eco2050 Institut für Nachhaltigkeit GmbH
Dr. Dina Barbian	eco2050 Institut für Nachhaltigkeit GmbH
Bernhard Vogginger	TU Dresden
Uwe Fohry	SEITEC GmbH
Dr.-Ing. Jia Lei Du	Salzburg Research Forschungsgesellschaft mbH
Antje Klemichen	VDI
Robin Schwiewer	Universität Bielefeld
Hannah Stein	DFKI
Prof. Dr. Hartmut Krause	TU Bergakademie Freiberg
Dr. rer. nat. Philipp Plänitz	Otto-von-Guericke-Universität
Phuong-Vy Elsesser	DIN e.V.

- **Organizations**[Fehler! Textmarke nicht definiert.]**, that have adopted this business plan (consortium members):**

Person	Organization
N.N.	N.N.
N.N.	N.N.
N.N.	N.N.

3 Objectives of the project

3.1 General

The increasing applicability and growing performance of artificial intelligence (AI) opens up a wide range of possibilities for the automated processing and preparation of complex data. The resulting increasing demand for AI applications goes hand-in-hand with an increasing consumption of resources, in particular energy and specialised hardware on which AI applications are executed, which can sometimes result in considerable costs. This increasing demand makes it necessary to compare AI applications in terms of their resource consumption. At the same time, AI is a very fast-moving technology and a large number of alternative hardware and software methods are currently being researched, which can differ significantly in terms of interfaces, performance and resource consumption.

This DIN SPEC aims to define a uniform measurement method for the resource consumption of AI applications. This offers a solution to the growing complexity of the IT landscape and enables companies and researchers to evaluate AI models in terms of their energy and resource consumption. This is particularly relevant for SMEs and companies without extensive IT resources and AI expertise, as this DIN SPEC enables simplified and consistent comparability between different technical solutions.

This DIN SPEC is intended to complement existing standards in the field of AI model evaluation, simplifying and accelerating the evaluation of new AI solutions. This DIN SPEC should be explicitly designed to include new AI software and hardware solutions and ensure platform-independent comparability. To this end, test procedures are standardised and uniform benchmarks for the use of AI are defined, which enable a direct assessment of resource consumption. This distinguishes the DIN SPEC from existing standards, which primarily enable comparability with regard to indirect measurements such as algorithmic complexity, memory consumption, computing time on conventional hardware, such as graphics processing units (GPUs), etc.

3.2 Planned scope

This document establishes an assessment methodology for artificial intelligence (AI) systems independent of the design of the algorithms and hardware. It is aimed at companies and researchers who regularly work with complex AI models, as well as AI users from different sectors who want to evaluate and compare the energy consumption of different solutions. This document is applicable to various industries in which AI is used to allow a defined assessment of the performance and efficiency, e.g., the accuracy, precision, and robustness of the measurements. This document helps correlate specifications and testing. This document does not seek to establish functional safety requirements. This document is intended for R&D personnel, AI hardware and software developers and data center operators.

3.3 Related activities

The subject of the planned DIN SPEC is not at present the subject of a standard. However, there are committees, standards and/or other technical rules that deal with related subjects and thus need to be taken into account - and involved or incorporated, where necessary - in this project:

- DIN EN 50600-4-8*VDE 0801-600-4-8 Information technology - Data centre facilities and infrastructures - Part 4-8: Carbon usage effectiveness; German version EN 50600-4-8:2022
- DIN EN 50600-4-9*VDE 0801-600-4-9 Information technology - Data centre facilities and infrastructures - Part 4-9: Water Usage Effectiveness; German version EN 50600-4-9:2022
- DIN CLC/TS 50600-5-1*VDE V 0801-600-5-1 Information technology - Data centre facilities and infrastructures - Part 5-1: Maturity Model for Energy Management and Environmental Sustainability; German version CLC/TS 50600-5-1:2023
- DIN CLC/TR 50600-99-2*VDE 0801-600-99-2 Information technology - Data centre facilities and infrastructures - Part 99-2: Recommended practices for environmental sustainability; German version CLC/TR 50600-99-2:2021

- DIN CLC/TR 50600-99-3*VDE 0801-600-99-3 Information technology - Data centre facilities and infrastructures - Part 99-3: Guidance to the application of EN 50600 series; German version CLC/TR 50600-99-3:2018
- DIN EN ISO/IEC 8183 Information technology - Artificial intelligence - Data life cycle framework (ISO/IEC 8183:2023); German and English version prEN ISO/IEC 8183:2024
- DIN SPEC 92001-1 Artificial Intelligence - Life Cycle Processes and Quality Requirements - Part 1: Quality Meta Model; Text in English
- DIN SPEC 92001-2 Artificial Intelligence - Life Cycle Processes and Quality Requirements - Part 2: Robustness
- DIN SPEC 92001-3 Artificial Intelligence - Life Cycle Processes and Quality Requirements - Part 3: Explainability; Text in English
- VDE-AR-E 2842-61-4 Development and trustworthiness of autonomous/cognitive systems - Part 61-4: Development at System Level; Text in English
- VDE-AR-E 2842-61-5 Development and trustworthiness of autonomous/cognitive systems - Part 61-5: Development at Technology Level; Text in English
- CLC/TS 50600-5-1 Information technology - Data centre facilities and infrastructures - Part 5-1: Maturity Model for Energy Management and Environmental Sustainability
- CLC/TR 50600-99-3 Information technology - Data centre facilities and infrastructures - Part 99-3: Guidance to the application of EN 50600 series
- prEN ISO/IEC 8183 Information technology - Artificial intelligence - Data life cycle framework (ISO/IEC 8183:2023)
- ISO/IEC 5338 Information technology - Artificial intelligence - AI system life cycle processes
- ISO/IEC 19395 Information technology - Sustainability for and by information technology - Smart data centre resource monitoring and control
- ISO/IEC 21836 Information technology - Data centres - Server energy effectiveness metric
- ISO/IEC 23544 Information Technology - Data centres - Application Platform Energy Effectiveness (APEE)
- ISO/IEC 30134-1 AMD 1Information technology - Data centres - Key performance indicators - Part 1: Overview and general requirements; Amendment 1
- ISO/IEC 30134-2Information technology - Data centres - Key performance indicators - Part 2: Power usage effectiveness (PUE)
- ISO/IEC 30134-2 AMD 1Information technology - Data centres - Key performance indicators - Part 2: Power usage effectiveness (PUE); Amendment 1
- ISO/IEC 30134-3Information technology - Data centres - Key performance indicators - Part 3: Renewable energy factor (REF)
- ISO/IEC 30134-3 AMD 1Information technology - Data centres - Key performance indicators - Part 3: Renewable energy factor (REF); Amendment 1

- ISO/IEC 30134-8 Information technology - Data centres key performance indicators - Part 8: Carbon usage effectiveness (CUE)
- ISO/IEC 30134-9 Information technology - Data centres key performance indicators - Part 9: Water usage effectiveness (WUE)
- ITU-T L Supplement 55 Environmental efficiency and impacts on United Nations Sustainable Development Goals of data centres and cloud computing
- ITU-T L.1304 Procurement criteria for sustainable data centres
- EUB 2021/2054*EUD 2021/2054*UED 2021/2054 Commission Decision (EU) 2021/2054 of 8 November 2021 on the sectoral reference document on best environmental management practices, environmental performance indicators and benchmarks of excellence for the telecommunications and information and communication technologies (ICT) services sector for the purposes of Regulation (EC) No 1221/2009 of the European Parliament and of the Council
- ISO/IEC CD TS 20125 Information technology - digital services ecodesign - ecopractices for life cycle stages
- ISO/IEC CD TR 20226 Information technology - Artificial intelligence - Environmental sustainability aspects of AI systems
- PWI Sustainable AI proposal Sustainable Artificial Intelligence - Guidelines and metrics for the environmental impact of artificial intelligence systems and services
- ISO/IEC DIS 12792 Transparency taxonomy of AI systems
- ISO/IEC 21031 Information technology - Software Carbon Intensity (SCI) specification
- ISO/IEC 19770-4 Information technology - IT asset management - Part 4: Resource utilization measurement
- ISO/IEC 19770-4 Information technology - IT asset management - Part 4: Resource utilization measurement
- ISO/IEC 5055 Information technology - Software measurement - Software quality measurement - Automated source code quality measures
- ISO/IEC 25010 Systems and software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) - Product quality model
- ISO/IEC/IEEE 12207 Systems and software engineering - Software life cycle processes
- ISO/IEC/IEEE 15288 Systems and software engineering - System life cycle processes
- DIN EN 50672 Ecodesign requirements for computers and computer servers
- DIN EN 50693 Product category rules for life cycle assessments of electronic and electrical products and systems; German version EN 50693:2019
- DIN EN IEC 63366 Product category rules for life cycle assessment of electrical and electronic products and systems (IEC 111/646/CD:2021)
- DIN EN ISO 14067 Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification
- DIN EN ISO 14040 Environmental management - Life cycle assessment - Principles and framework

- PAS 2050 Specification for the assessment of the life cycle greenhouse gas emissions of goods and services
- DIN EN 15603 Energy performance of buildings - Overarching standard EPBD; German version prEN 15603:2013
- DIN EN 16798-13 Energy performance of buildings - Part 13: Module M4-8 - Calculation of cooling systems - Generation; German version EN 16798-13:2017
- DIN EN ISO 14001 Environmental management systems - Requirements with guidance for use (ISO 14001:2015); German and English version EN ISO 14001:2015
- DIN EN ISO 14064-1 Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals (ISO 14064-1:2018); German and English version EN ISO 14064-1:2018
- DIN EN ISO 50001 Energy management systems - Requirements with guidance for use (ISO 50001:2018); German version EN ISO 50001:2018
- ISO 10303-1 Industrial automation systems and integration - Product data representation and exchange - Part 1: Overview and fundamental principles
- CEN/CLC/TR 18145:2025 Environmentally sustainable Artificial Intelligence
- VDE SPEC 9033: Neuromorphic Computing auf Basis neuartiger Bauelemente – ein Schichtenmodell für die Entwicklung von KI-Hardware

4 Work programme

The aim of the project is to develop a DIN SPEC according to the PAS procedure (see www.din.de/go/din-spec-en). The DIN SPEC shall be consistent with the body of German standards and shall not be in conflict with any DIN Standard.

The kick-off meeting took place on 20.10.2025. The project duration will be about 6 months.

At this kick-off meeting, the consortium for developing the DIN SPEC will be constituted, further organizational issues will be decided on and clarified, and, where possible, work on the subject matter will be begun.

A draft for public commenting will not be published.

A total of 2 project meetings (kick-off meeting and work meetings) and 6 web conferences will be held, during which the content of the DIN SPEC will be presented, discussed and approved. The content of the DIN SPEC can be drawn up by individual consortium members or in working groups.

Dates of further meetings and/or web conferences are to be agreed on within the consortium in consultation with DIN.

The DIN SPEC will be drawn up in German (language of meetings, minutes, etc.). The DIN SPEC will be written in English.

NOTE The calculation covers only one language version. Please keep in mind the fact that other language versions involve additional expenses; for this reason, they shall be agreed on separately. If another language version is desired, DIN Media can provide a translation. Requests for translations are to be submitted after the DIN SPEC manuscript has been approved for publication.

5 Resource planning

Each consortium member bears its own expenses incurred in the course of the project.

If the DIN Executive Board approves the implementation of the project, the initiator concludes a contract with DIN.

Membership of the consortium and participation in the project meetings is free of charge, as the costs incurred by DIN in carrying out the project are financed by the subcontract with funds from the research project "ENERGY-EFFICIENT LARGE-SCALE ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE DATA CENTERS (ESCADE)" - funded by the Federal Ministry of Economic Affairs and Energy (BMWE) (funding code: 01MN23004A).

6 Rules of cooperation in the DIN SPEC consortium

This project is governed by the PAS procedural rules. All interested parties and consortium members are to inform themselves of these procedures by going to www.din.de/go/din-spec-en.

The consortium will be constituted during the course of the kick-off meeting. The kick-off meeting will not take place until the business plan has been published and approved by DIN's Management Board. The consortium shall comprise at least three members from different organizations[1]. It is not necessary that these members come from different areas and represent different stakeholders. By approving this business plan, the interested parties declare their willingness to participate in the consortium and will be formally named as consortium members, with the associated rights and duties. Participants at the kick-off meeting who do not approve the business plan are not given the status of a consortium member and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the project.

If an organization (e.g. an association) sends someone who is not an employee to the consortium, this person shall be authorized by the organization, who shall provide proof of this to DIN.

Each consortium member is entitled to vote and has one vote. If an organization sends several experts to the consortium, that organization has only one vote, regardless of how many consortium participants it sends. Transferring voting rights to other consortium members is not permitted. During voting procedures, decisions are passed by simple majority; abstentions never count.

As a rule, the consortium is closed once it is constituted. The current consortium members shall decide whether any additional members will be accepted or not.

During the kick-off meeting, the consortium members shall elect a consortium leader, who is responsible for content management and any decision-making and voting procedures. The leader is supported by the responsible DIN Project Manager, whereby DIN will always remain neutral regarding the content of the DIN SPEC. Furthermore, the DIN Project Manager shall ensure that DIN's rules of procedure, rules of presentation, and the principles governing the publication of DIN SPEC have been

[1] Organizations are legal entities and natural persons, insofar as they participate in business transactions on a commercial or freelance basis. If several legal entities are part of a group or a corporate structure within the meaning of Section 15 of the German Stock Corporation Act (§ 15 Aktiengesetz) or Section 271 (2) of the German Commercial Code (§ 271 Absatz 2 Handelsgesetzbuch), they are deemed to be one organization.

observed. Should a consortium leader no longer be able to carry out his/her duties, the DIN Project Manager shall initiate the election of a new leader.

The DIN Project Manager is responsible for organizing and leading the kick-off meeting, in consultation with the initiator. Further project meetings and/or web conferences shall be organized by the DIN Project Manager in consultation with the consortium leader.

If consortium members cannot be present when the DIN SPEC or its draft is approved, an alternative means of including them in the voting procedure shall be used (e.g. in writing, electronically).

All consortium members who voted for the publication of the DIN SPEC or its draft will be named as authors in the Foreword, including the organizations which they represent. All consortium members who voted against the publication of the DIN SPEC or its draft, or who have abstained, will not be named in the Foreword.

Any expansion of the consortium at a later date is decided on by the members making up the consortium at that time. It is particularly important to consider these aspects:

a) expansion would be conducive to shortening the duration of the project or to avoiding or averting an impending delay in the planned duration of the project;

b) the expansion would not result in the project taking longer to complete;

c) the new consortium member would not address any new or complementary issues beyond the scope defined and approved in the business plan;

d) the new consortium member would bring complementary expertise into the consortium in order to incorporate the latest scientific findings and state-of-the-art knowledge;

e) the new consortium member would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;

f) the new consortium member would ensure wider application of the DIN SPEC.

To allow the legal reproduction and distribution of results for the purposes of project work, the consortium members grant DIN rights of use on the basis of the copyright that will accrue to them for the results of their work on the DIN SPEC. The transfer of these utilization rights does not prevent the consortium members from using and further developing the knowledge, experience and findings they bring to the project.

Consortium members are requested to inform DIN of all patent rights known to them to be relevant to this DIN SPEC project.

Subsequent changes to the scope (Section 3.2) or to the resource planning (Section 5) require, in addition to a two-thirds majority of all votes cast, the approval of DIN.

7 Contacts

- **Consortium leader:**

  Dr. Andreas Hantsch

  eco2050 Institut für Nachhaltigkeit GmbH, Hantsch Sustainability Consulting

  Königstr. 7

  90402 Nürnberg

- **Project manager:**

  Phuong-Vy Elsesser

  DIN German Institute for Standardization

  Am DIN-Platz

  Burggrafenstraße 6

  10787 Berlin

  Tel.: + 49 30 2601- 2334

  Fax: + 49 30 2601 - 42334

  E-Mail: phuong-vy.elsesser@din.de

- **Initiator:**

  David Kappel

  Universität Bielefeld, Center for Cognitive Interaction Technology (CITEC)

  Universitätsstrasse 25

  D-33615 Bielefeld

  +49 521 106-12107

  david.kappel@uni-bielefeld.de

Annex: Project schedule (preliminary)

DIN SPEC Project	2025												2026											
	Jul		Aug		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul	
Initiation																								
1. Request and review																								
2. Business plan drawn up																								
3. Publication of business plan																								
Development phase																								
4. Kick-off meeting/consortium constituted																								
5. DIN SPEC drawn up																								
6. DIN SPEC approved by consortium																								
Publication																								
7. Review and release by DIN																								
8. Publication of DIN SPEC																								
Milestones							**K**		**W**		**W**			**W**		**W**		**M / A**						

K Kick-off
M Project meeting
W Web conference
A Adoption of DIN SPEC