

ROADMAP SUSTAINABLE NIKHEF

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1 CURRENT SITUATION

The following sections briefly describe Nikhef's CO₂ footprint and the steps Nikhef has already taken to become more sustainable.

CO₂ footprint

A carbon footprint is the calculation of an organization's greenhouse gas emissions. In all activities such as energy use, mobility, transport, construction and air travel, CO₂ and other greenhouse gases are released. A CO₂ footprint provides an overview of the amount of CO₂ emitted per emission source and the percentages that the emission sources contribute to the total emissions of the organization. This provides an organization with insight into the largest contributors to its CO₂ emissions and therefore allows it to take targeted action to reduce emissions. CO₂ footprint of Nikhef for 2019 and 2020.

Nikhef's carbon footprint for 2019 and 2020

Table 1 shows the CO₂ emissions in tons per activity and total for Nikhef in 2019 and 2020. Figure 1 is a visual representation of the table. Figure 2 shows Nikhef's CO₂ footprint for 2019 and 2020 in percentages.

Nikhef's carbon footprint is based on greenhouse gas emissions from energy use and mobility (both commuting and business travel) and was first prepared in early 2020 for the year 2019. This year the footprint was prepared for the year 2020. With this footprint the Nikhef captures all direct emissions (what comes out of my chimney) and a large part of the indirect emissions (commuting and air travel). Consideration may be given to including topics such as waste, catering and purchasing in the footprint at a later date, but there is currently too little data available to report on this.

For 2019, Nikhef's total CO₂ footprint was 1,082.1 tons of CO₂. In 2020, Nikhef's total CO₂ emissions were 406.6 tons of CO₂. This is a significant reduction compared to the previous year. This is mainly explained by the lower number of business air travel. In 2019, emissions from business air travel accounted for 70% of Nikhef's total CO₂ footprint, amounting to 757.9 tons of CO₂. In 2020, emissions from business air travel were 132.8 tons of CO₂, which is less than a fifth of the amount of emissions in 2019. Of course, the decrease in air travel can be explained by the COVID-19 pandemic, which reduced travel from March 2020. The amount of commuting has also decreased significantly since March 2020. Emissions from commuting by car have dropped by more than half compared to 2019, and emissions from commuting by train in 2020 are even ten times lower than in 2019¹. What is further noticeable is that CO₂ emissions from natural gas increased both in percentage and absolute terms in 2020.

| Source/activity | CO ₂ emissions 2019 (in tons) | CO ₂ emissions 2020 (in tons) | Percent change 2019/ 2020 |
|---------------------------------|---|---|---------------------------|
| Natural Gas | 150,4 | 160,6 | +6.8% |
| Own fleet | 3,9 | 3,4 | -12.83% |
| Commuting/work train | 28,9 | 2,7 | -90.67% |
| Commuting/work car | 117,5 | 47,5 | -59.58% |
| Business travel car | 21,0 | 6,2 | -71.48% |
| Business travel flying | 757,9 | 132,8 | -82.48% |
| Business travel train | 2,4 | 0,5 | -79.77% |
| Total CO ₂ emissions | 1.082,1 | 406,6 | -62.42% |

¹ Unlike the other figures, the commuting figures for 2020 are not exactly monitored. They are based on the occupancy figures of the Nikhef building and on a reasoned assumption of the proportion of car and public transport use in commuting traffic.

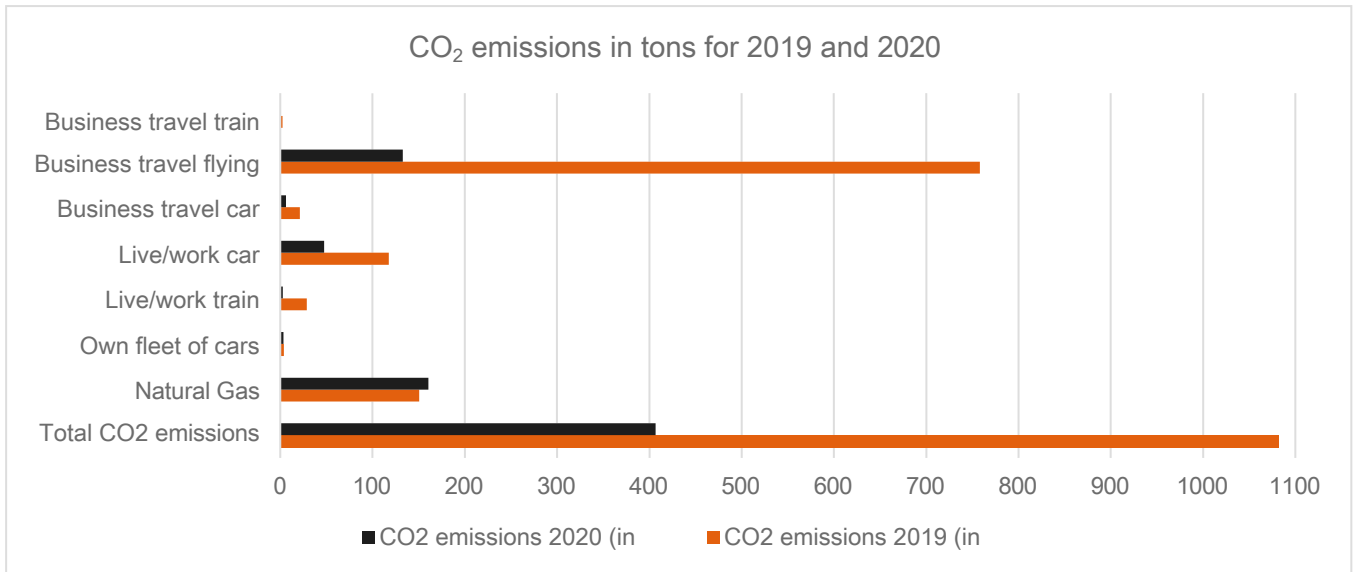


Figure 2 CO₂ emissions in tons per activity and total for Nikhef in 2019 and 2020

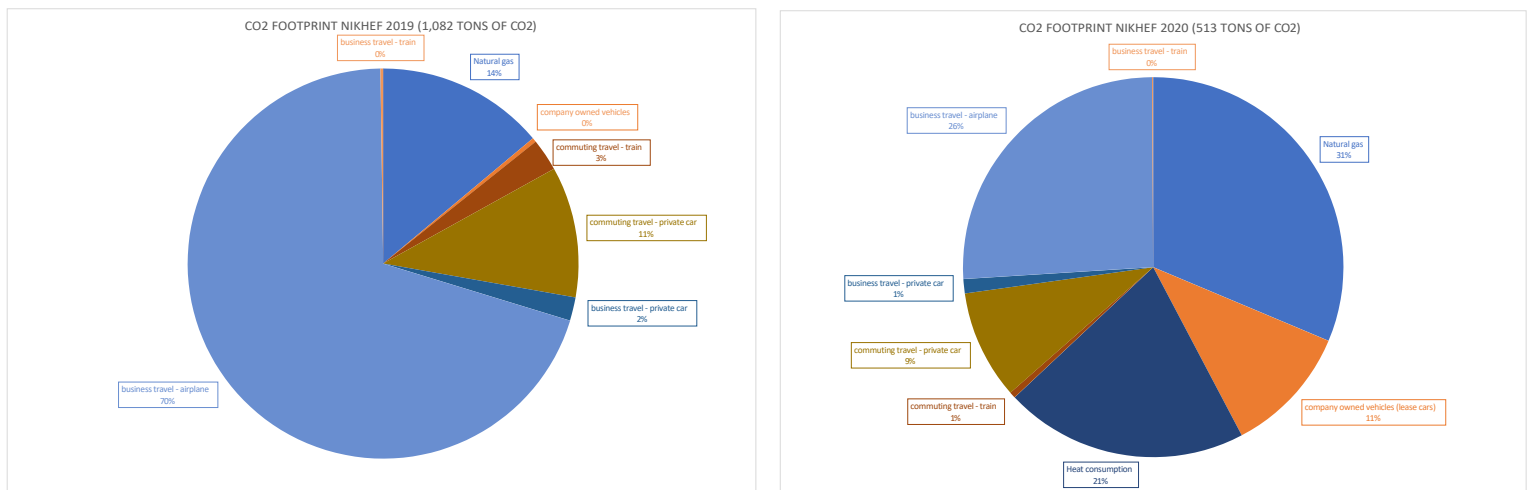


Figure 1 Nikhef's CO₂ footprint for 2019 & 2020 in percentages

What is Nikhef already doing?

When it comes to sustainability, Nikhef has already made considerable strides in some areas. The Nikhef renovation and the Ketelhuis renovation, which will both be completed in 2021 - 2023, stand out the most. During this renovation, energy-efficient techniques will be implemented. In addition, Nikhef has an agreement from 2022 to 2031 for the supply of green electricity generated in the Netherlands (joint purchase by WCW, UvA, HvA). Over the past year, enthusiastic members of the "Sustainability Working Group" have brought sustainability to the attention of Nikhef's DT. Communication with and to staff on this topic remained outstanding. With the Sustainability Roadmap, Nikhef aims to bring sustainability structurally to the attention of students and staff.

GOALS 2030 AND INTERIM GOALS 2025

Ambition: climate neutral

Energy



Mobility



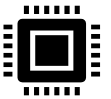
Waste



Awareness & Behavior



Primary



2030

All Nikhef buildings are energy neutral

50% less environmental impact from business

Produce no residual waste at Nikhef

Sustainability is standard part of thought processes

Have European plan ready for sustainable science (CERN)

All Nikhef employees are very conscious of building-related energy use

Commuting climate neutral

Have European plan ready regarding detector waste and reuse parts

Ecological impact is considered by default in (investment) decisions

Science projects are climate neutral

2025

Submetering of major energy flows

25% Less business travel due to sustainable travel policy (2019)

Electronic waste is handled responsibly

Rewarding sustainable

25% of research proposals include sustainability aspects

Improved energy performance building: insulation, green power, waste heat utilization

Organize meetings more online and clustered

Substantial portion of leaked liquids in nature, has been reduced

Sustainability standard chapter in application reporting of research projects

Understanding the energy use of computing

2ACTION PLAN BY THEME

1. Energy

| Energy | Goal 1 |
|-----------|---|
| 2030 | All Nikhef buildings are energy neutral |
| 2025 | Improved energy performance building: insulation, green power, waste heat utilization and solar panels |
| Indicator | <ul style="list-style-type: none">• % own energy generation• Share of renewable energy |

What are we going to do?

1. Install solar panels (1,600 m2 roof area), possibly combining with a green roof

First action: seeking investment space

2. Limit choice of personal computing; Desktop or laptop, not both. One large screen or two small ones.

First action: Agenda at Computer User Consultation (CGO).

| Energy | Goal 2 |
|-----------|--|
| 2030 | All Nikhef employees are very conscious of building-related energy use |
| 2025 | Submetering of major energy flows |
| Indicator | Energy use |

What are we going to do?

1. Encourage efficient use of computing facilities

First action: installing remote 'on and off button'

2. Turn off devices when not in use

First action: automatically turning off screens in meeting rooms

3. Wise use of heating and air conditioning: only when rooms are used

First action: calling attention to unwise behavior

4. Show what Nikhef's (building-related) energy use is

First action: Explore tools for easily visualizing the energy use of computing operations

5. Executives lead by example

First action: discuss role model in OPL and TGL consultations

2. Mobility

| Mobility | Goal 1 |
|------------|---|
| 2030 | 50% less environmental impact from business travel (2019) |
| 2025 | 25% Fewer business trips take place as a result of sustainable travel policies |
| Indicators | <ul style="list-style-type: none">(Average and total) CO₂ emissions from air travel booked*(Average and total) CO₂ emissions from booked domestic and international train trips*CO₂ consumption total business travelConsumed CO₂ budget <p>*by department, by type of activity, by function</p> |

| Mobility | Goal 2 |
|-----------|--|
| 2030 | Commuting climate neutral |
| 2025 | Meetings are organized more online and clustered |
| Indicator | CO ₂ emissions commuting |

What are we going to do?

1. Travel less by plane

First action: Realization of dedicated presentation and video conference rooms

2. Taking the train for meetings outside NL

First action: Display good and clear travel alternatives in the travel system so that impact on environment and time can be properly weighed

3. Encourage meetings for the purpose of experiments & events to also be offered online

First action: designate one person responsible per experiment to jointly draw up an action plan with indicators and realize collaborations

4. Commuting by train

First action: Explore the option of counting sensibly used hours during commuter train trips as work hours

5. Align travel goals: Sustainable travel together or don't travel all together

First action: Organize central (for all to see) overview of everyone's planned travel goals, destinations, date.

6. Working with a ^{carbon} budget for business travel

First action: explore and establish realistic CO₂ budgets based on current travel behavior

3. Waste and Circularity

| Waste and Circularity | Goal 1 |
|-----------------------|--|
| 2030 | Produce no more residual waste at Nikhef |
| 2025 | Electronic waste is handled responsibly |
| Indicators | Volumes and CO ₂ emissions from different waste streams |

What are we going to do?

1. Inventory of CO₂ footprint of different waste streams Nikhef local & Experiment-wide

First action: identify volumes and CO₂ emissions from various waste streams

2. Realization of optimal waste separation for WCW site, fulfillment dependent on choice of pre- or post-separation

First action: draw up waste separation advice for WCW site, joint decision for pre- or post-separation, draw up and implement waste concept

3. Collect electronic waste centrally and have it disposed of responsibly

First action: Set up electronic collection point after which company can be selected for processing electronic waste

4. Double-sided and black printing as default settings for printers

First action: change printer settings of all printers at Nikhef

| Waste and Circularity | Goal 2 |
|-----------------------|--|
| 2030 | Have European plan ready regarding detector waste and component reuse |
| 2025 | Substantial portion of leaked liquids used for experiments in nature, has been reduced |
| Indicators | Amount of leaked liquids (for experiments) in nature |

What are we going to do?

1. Create plan of action for reduction of leaked (research) material

First Action: Designate one person responsible to develop a plan of action to reduce spills in nature.

2. Create plan of action to achieve a European plan for detector waste and component reuse

First action: Appoint one person responsible for realizing the European plan that will eventually be submitted to Brussels. Then gather a team and whether external guidance is necessary. Investigate which experiments involve detector waste and what opportunities for reuse exist.

4. Attitude and behavior

| Attitude and behavior | Goal 1 |
|-----------------------|--|
| 2030 | Sustainability is standard part of Nikhef's thought processes |
| 2025 | Sustainable behavior is rewarded |
| Indicators | <ul style="list-style-type: none"> Number of reward actions carried out and number of initiatives aimed at (focusing on) making Nikhef more sustainable Financial contribution to sustainability initiatives including reward actions Number of communications aimed at sustainability Sustainability experience of students and staff (how sustainable do you think Nikhef is?) |

What are we going to do?

1. Encourage good behavior:

- Propaganda at printers and coffee mugs
- Public display of consumption show on info screens in Spectrum and at computer rooms
- Goat wool socks - assign points to executives who lead by example
- Include sustainability as an agenda item on induction day for new employees

Initial actions:

- Propaganda posters further fine-tuned and hung
- Collect available data on consumption and turn it into appealing dashboard
- Establish criteria for geeky points/award and create mini plan of action
- Make a PPT in which (why, how, what) the desired behavior regarding sustainability is described and seek alignment with HR.

2. Reward good behavior with monthly promotions:

- Free cake/ fruit when picking up lunch without meat
- Incentive for employees who take train instead of plane

First action: add and link monthly actions to (campaign) themes

3. Inspire:

- Combine group outings with a "charity" activity
- Organize inspiration session with keynote speakers

Initial actions:

- Prepare and distribute list of possible group outings
- Prepare list of interesting keynote speakers

4. Creating a sustainability working group that meets regularly

First Action: Explore status of current sustainability working group and formulate goals for (relaunch) or new working group.

| Attitude and behavior | Goal 2 |
|-----------------------|---|
| 2030 | Ecological impact is included by default in (investment) decisions |
| 2025 | Sustainability is standard chapter in application and reporting of research projects |
| Indicator | <ul style="list-style-type: none"> Number of times sustainability is included in reporting Number of times (absolute and percentage) that sustainability was included in investment decisions |

What are we going to do?

1. Develop handout with tips and tricks for reporting on sustainability

First action: Investigate how other colleagues/ schools/ companies include sustainability in their reporting

2. Add sustainability standard paragraph in investment decisions

First action: draft standard sustainability paragraph for investment decisions

5. Primary process

| Primary Process | Goal 1 |
|-----------------|--|
| 2030 | European plan for <i>sustainable science (CERN)</i> |
| 2025 | 25% of research proposals include sustainability aspects |
| Indicators | <ul style="list-style-type: none">• Number of research proposals that include sustainability• Number of consultations international working group on sustainable research |

What are we going to do?

1. Work on an EU scale on *sustainable science (CERN)*.

First action: establish international working group to work on aspects of "sustainable research in High Energy Physics"

2. Submit research proposals that include sustainability aspects, e.g., *Efficient data analysis in high energy physics*

First action: Explore which sustainability issues can be included in research proposals

| Primary process | Goal 2 |
|-----------------|--|
| 2030 | Science projects are climate neutral |
| 2025 | Understanding the energy use of computing |
| Indicators | <ul style="list-style-type: none">• Number of orders and flights per project• Average energy consumption of computing |

What are we going to do?

1. Energy use of computing monitors

First action: establish monitoring plan in consultation with Nikhef computing

2. Encourage and reward energy efficient research/computing

First action: present results energy monitoring during Nifhef jamboree and establish award for most energy efficient research. At later stage establish top 10 list of most energy efficient projects

3IMPLEMENTATION OF ACTION PLANS

Implementation Plan

For successful and sustainable implementation of action plans, it is important to have a good communication plan, a schedule with clear milestones, and a monitoring plan with attention to data collection.

Communication and awareness

To bring people along with the desired change and actually achieve different behavior, communication is crucial. The following describes how Nikhef colleagues can be informed about the goals and actions in the sustainability roadmap, how they can be inspired and involved in the changes. Communication channels that can be used are: e-mail, mirror moments, *social media* and the intranet.

Inform and inspire colleagues

- Provide information on new practices and supported tools such as:
 - o Overview of green travel options
 - o Location of electronic waste collection point
- Disseminate what Nikhef is all about. Make small and medium-sized actions visible to others:
 - o Communicate status of experiments regarding remote collaborations/conferences
 - o Communicate about the status of achieving sustainability ambitions and make it a regular part of the annual meeting
- Organize knowledge/inspiration sessions
 - o Give keynote speakers a stage
 - o Create a *carbon* footprint of the average Dutchman and the average Nikheffer with explanations and interpretation of the numbers.
 - o Understand the *carbon* impact of daily activities and in a session, address the question: where can you make a difference?

Engaging colleagues

- Give the "Homework Mail" in Corona Time an environmentally conscious touch: Ask what sustainability means to colleagues:
 - o Why is sustainability important to you?
 - o What conscious choices are you making now?
 - o How would you like to contribute more in the future?
- Set up contests related to sustainability:
 - o Who has the best idea for most 'efficient computing'?
 - o Etc.
- Ask in a survey what might motivate colleagues to travel differently and under what conditions
- Include all sustainability sub-themes in a biennial review and ask questions such as:
 - o How do you like the new travel measures? How do you like the new conference rooms? How easy is the new electronic meeting point to find, etc.?
 - o What do you need/what good ideas do you have yourself?

Global planning

- The DT receives the document from the working group
- The DT adopts the document as the basis for Nikhef's sustainability policy (May).
- The DT submits the document for advice (modification, addition) within Nikhef to, among others, NOR, TGL consultation, OPL and drafters of the Sustainable Nikhef Roadmap (June - August) .
- The DT adopts the final roadmap (Sep-Oct), including details of implementation (e.g., appointment/designation of a sustainability officer and a budget estimate);
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Monitoring, evaluation and reporting

In order to actually achieve the 2025 and 2030 goals, it is important that they be measured, evaluated and, if necessary, adjusted periodically and systematically. To this end, a monitoring plan must first be drawn up. The table below lists the indicators for the five sustainability themes that are part of Nikhef's sustainability roadmap. The way in which the data for these indicators is generated should be further investigated and included in the monitoring plan.

| Theme | Indicators |
|------------------------------|---|
| Energy | <ul style="list-style-type: none"> • Energy use • % own energy generation • Share of renewable energy |
| Waste and Circularity | <ul style="list-style-type: none"> • Volumes and CO₂ emissions from various waste streams for both Nikhef locally, and for the experiments Nikhef is working on • Amount of leaked (research) material |
| Attitude and behavior | <ul style="list-style-type: none"> • Number of reward actions carried out and number of initiatives aimed at (focusing on) making Nikhef more sustainable • Financial contribution to sustainability initiatives including reward actions • Number of communications aimed at sustainability • Sustainability experience of students and staff (how sustainable do you think Nikhef is?) • Number of times sustainability is included in reporting • Number of times (absolute and percentage) that sustainability was included in investment decisions |
| Mobility | <ul style="list-style-type: none"> • (Average and total) CO₂ emissions from air travel booked* • (Average and total) CO₂ emissions from booked domestic and foreign train trips* • CO₂ consumption total business travel • Consumed CO₂ budget <i>*by department, by type of activity, by function</i> |
| Primary Process | <ul style="list-style-type: none"> • Number of research proposals that include sustainability • Number of consultations international working group on sustainable research • Number of orders and flights per project • Average energy consumption of computing |

Key points of interest for implementation at Nikhef

In addition to the institute-transcending success factors and risks for the implementation of the actions in the roadmap (see Chapter 4 Roadmap NWO-I), specific concerns for implementation at Nikhef are described below.

Success factors for implementation

1. It is important that everyone understands why these goals and actions are so important. Nikheffers are sensitive to graphs and figures and are less likely to read chunks of text.
2. The actions and new practices should be simple, approachable and user-friendly.
3. It is important that Nikheffers be facilitated in making good choices.
4. Start small, work with pilots, and then roll out broadly to other parts in the organization.
5. Appoint a sustainability manager to implement action plans.

Risks and challenges

There is a risk that the implementation of the various action plans may meet resistance from employees and students. For example, there are concerns that sustainability may come at the expense of project quality. In addition, some employees and students experience the workload as high. Sustainability can therefore feel like something extra that has to be done on top of the existing work. It is therefore extra important that sufficient time and resources are available for implementation. Furthermore, delays in the implementation of action plans can occur when decision points have to pass through many intermediaries. Another risk is that the desired behavioral change may be slower than hoped. Getting people on board with the change is therefore seen as the biggest challenge in this project.