

DGNB evaluation and use of KTV Working Drone

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Introduction:

New constructions are being built with DGNB certification as residents, investors, and society have begun to demand sustainable building. KTV Working Drone naturally cannot ignore this and has, therefore, chosen to have this report prepared on their behalf.

The report aims to show their customers how their concept relates to the building's DGNB certification compared to the traditional methods of cleaning and maintenance of the building.

KTV Working Drone's window and facade cleaning solution is innovative, cost-effective, and 100% safe, as the need for lifts, professional climbers, and scaffolding becomes redundant.

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1.1 KTV Working Drone can increase your tall building's DGNB value

By using KTV Working Drone to clean the facade, windows, solar panels, and climate screen on your tall and not easily accessible building, you can significantly reduce the building expenses for cleaning, both in the design phase and in ongoing operation and maintenance. This applies to the indirect costs for various aids, safety fittings, construction conditions, pull testing of fittings, and the cleaning process itself.

These conditions and reduced costs can and should be included in a revised evaluation of a building's DGNB evaluation, value in DGNB terms, at certification and hence DGNB status level.

We estimate that the total score can be raised by up to 2.5% points (after weighting etc.)

If a building's DGNB status and certification level can thus be raised, for example, from Silver to Gold, it also increases the building's actual and sales value. Just as it simplifies the cleaning task, provides savings and can extend a building's lifespan.

1.2 Input for DGNB Evaluation and Certification

Below we have schematically set up and directly compared five different methods for cleaning the exterior parts of the building in relation to the allocation of DGNB evaluation points. The table shows how the total score without weighting can be raised by a factor of 2-5 times depending on the current maintenance concept and the building's accessibility.

See **the table** below:

"Sustainability in connection with cleaning of exterior building components, facades, and glass areas, in relation to DGNB and operating costs."

On the attached link, there is an example of a publication from the Green Building Council Denmark as a mini-guide to the DGNB system: [miniguide_july_2013_screen_singles.pdf \(ucviden.dk\)](https://www.gbc.dk/media/10000/miniguide_july_2013_screen_singles.pdf)

This publication, the mini-guide, is an introduction to the DGNB certification system in Denmark and aims to give the reader an insight into how each individual criterion is significant for the overall sustainability of the construction. The criteria for the building category "New office and commercial buildings", which is the first and basic certification system within the DGNB standard, are used as a starting point. You are always welcome to contact the association's secretariat at info@dk-gbc.dk for more information about DGNB certification in Denmark.

1.3 Sustainability in connection with cleaning of exterior building components, facades, and glass areas, concerning DGNB and operating costs

In **the table** below, we want to set up a method for evaluating and analysing operating costs for cleaning facades on larger, tall, and complex buildings where there is traditionally a need for expensive, complex, and dangerous aids, machines, setups, and execution methods.

The use of the KTV Working Drone is considered a standard aid. This table illuminates five criteria: accessibility, safety, environment, climate impact, and bonus.

A separate evaluation should be conducted in relation to the specific building and cleaning task. The allocation of points is shown as a general example. DGNB share, weighting, and bonus will also be included in the overall DGNB evaluation for the building complex. The table illuminates five different exterior cleaning methods.

Weighted analysis, where an assessment of sustainability is set up based on the DGNB evaluation and allocation of points.

	Window cleaning performed manually with telescopic rod and water system. From terrain, terraces, balconies without the use of additional aids	Window cleaning performed traditionally with squeegee from an externally set up lift or from a crane basket	Window cleaning performed traditionally with squeegee from an integrated service crane on the roof	Window cleaning performed traditionally with rappelling with ropes, harnesses, and water system	Window cleaning performed with a drone and heated lime/chaulk-free water with pressure from a nozzle on the drone
1 - Accessibility: Is window cleaning possible?	1	8	5	3	10
2 - Are there measures and necessary fittings to be able to use and control the washing system in a cheap and easy way?	8	5	2	2	10
7 - Detailed concept ensuring that the building is cleaning-friendly when performed with this cleaning system	8	5	2	1	10
8 - DGNB 'heart' weighting with respect to awarded points	(17)	(18)	(9)	(6)	(30)
General: Working environment and safety risk	7	5	5	1	9
Innovation points	0	0	1	0	2,5
3 - Economy, lifetime costs for maintenance (exterior)	40 (0-80 partly accessible)	10	0	20	80
CO2 impact, climate bonus	15	0	10	20	30
Total score without "DGNB Heart"	79	33	25	47	151,5

1.4 Explanation and walkthrough of the analysis table in relation to different cleaning methods:

Accessibility: Is window cleaning possible?

Based on Criterion 40: Cleaning and Maintenance

Goal: The building's cleaning and maintenance needs should be minimized. Easy cleaning and maintenance of the building significantly impact the costs and the environment during the building's operational phase. Areas that can be easily cleaned require fewer cleaning agents and thus have lower costs.

With the use of KTV Working Drone's solution, there is complete and easy accessibility: **10 points.**

Are there provisions and necessary fittings implemented to be able to use and control the washing system inexpensively and easily?

Washing carried out by KTV Working Drone does not require devices, fixed-mounted fittings, and control systems.

Using KTV Working Drone's solution, we have the necessary provisions with very few costs: **10 points.**

Is there a detailed concept that ensures that the building is cleaning-friendly when performed with this cleaning system?

Washing carried out by KTV Working Drone is fundamentally constructed and described by a relatively simple concept.

KTV Working Drone provides the customer during the execution a fully described concept, which can be included in the building's O&M manual: **10 points.**

DGNB 'heart' weighting with respect to awarded points:

With the KTV Working Drone's concept, it is possible to achieve a good DGNB 'heart' weighting as they can achieve maximum points in 3 out of 7 criteria.

Working environment and safety risk:

KTV Working Drone's global guidelines consist in minimizing the impact on the environment. Not to harm or disturb uninvolved persons. Not to cause damage to buildings, vehicles or people, they always operate according to European GDPR. KTV Working Drone also has a "patent pending" solution for securing the drone from the roof, eliminating the possibility of the drone crashing to the ground and hitting uninvolved people. The risk of damage to the environment and people is minimized: **9 out of 10 points.**

Innovation points:

The use of the KTV Working Drone's concept is as technologically advanced as it gets and is certainly an innovative initiative: **2.5 points.**

Economics, lifetime costs for maintenance (exterior):

The cleaning costs include the cost of cleaning over the building's lifetime. Cleaning costs are typically a significant part of the total costs. To reduce this item, it is therefore important to consider accessibility and cleaning-friendly materials in the design phase for the areas of the building that need to be cleaned.

Goal:

Economics should be viewed as a resource. Building-related LCC includes minimizing the building's lifecycle costs over a calculation period of 50 years. In the conventional planning and construction process, there is often a primary focus on minimizing materials and construction costs. At the same time, the subsequent operating expenses often receive significantly less focus. It is essential that cost savings in the construction phase are not made at the expense of future users and owners, and the building's economics should therefore be assessed based on a total overall assessment.

Cleaning performed with KTV Working Drone is a quick, easy maintenance process and method for the exterior of the building. It may be the cheapest overall: **80 points.**

Note: The economic criterion is often where an owner and operating organization see the most significant gain, and with the possibility to reduce operating costs, they choose the KTV Working Drone's concept.

1.5 Conclusion:

By using KTV Working Drone's concept for cleaning carried out with a drone, there is the possibility to:

- Achieve savings on O&M (Operations & Maintenance) costs
- Extend the lifespan of the building through regular washing
- Improve DGNB evaluation and gain higher sustainability certification points.