



# EFFC/DFI Joint Task Groups

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## Newsletter Autumn 23

This Newsletter presents an update on the work & progress of the EFFC/DFI Joint Task Groups:

- Carbon Calculator
- Support Fluids
- Sustainability Guides
- Tremie Concrete
- Working Platforms

Copies of all the Guides can be downloaded free of charge from [www.ffc.org](http://www.ffc.org) and [www.dfi.org](http://www.dfi.org)

Edited by Chris Harnan - October 23



EUROPEAN FEDERATION OF FOUNDATION CONTRACTORS





## EFFC/DFI Carbon Calculator (Luca Bruni and Chris Nelsen)

The EFFC/DFI Carbon Calculator Task Group (CCTG) has had a successful year evaluating the need and feasibility of updates to the EFFC/DFI Carbon Calculator.

To kick off 2023, Version 5 of the EFFC/DFI Carbon Calculator was released with an updated carbon emission factor database completed by our third party consultant, Carbone 4. This update maintained the existing tool's user-friendly structure and interface, and ensured users get accurate results.

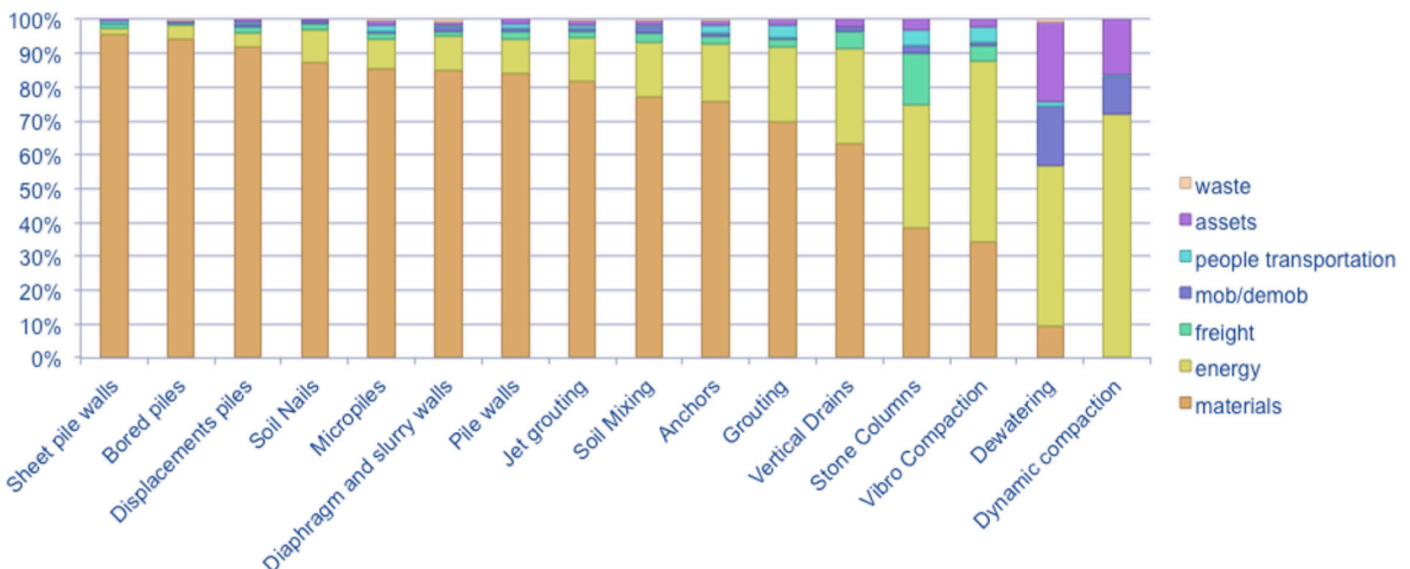
The CCTG also partnered with the Sustainability in Geotechnical Engineering Committee of the American Society of Civil Engineers (ASCE) to apply for and receive funding for a student-led research project on the subject of carbon calculators available for geotechnical engineering. The partnership released a Request for Proposals for the scope of work and accepted a Proposal from Dora de Melo, PhD Candidate at UC Davis. Dora has completed a 5-month study on existing carbon calculators, including the EFFC/DFI Carbon Calculator, evaluating their applicability for geotechnical construction projects. Dora's draft report has been finalized and submitted to the CCTG for review and comment. She will also present her findings at a number of industry events.

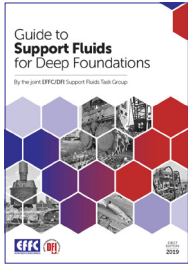
The CCTG also released a user survey to solicit feedback on the current form and function of the EFFC/DFI Carbon Calculator. The survey received over 60 responses, and the CCTG is diving into the data to help inform future work. In Italy, the CCTG is working with the Italian Government to ensure that the software is accepted and promoted as a reference program for tenders in the country. This is an important first exploratory step that could constitute a basis to be extended to a global level.

Lastly, the CCTG has identified three focus areas for continued efforts of Task Group members. First, as mentioned above, select members will digest results of the user survey and provide a compilation of suggestions for improvement. Second, members will draft a project reporting template to gather recent project case studies and brainstorm outreach and solicitation strategies. Third, members will consolidate notes from past brainstorming sessions into a single, coherent proposal to modify the EFFC/DFI Carbon Calculator for review and approval by DFI and EFFC.

To wrap up the year, an article celebrating the 10th anniversary of the EFFC/DFI Carbon Calculator will be published in the next issue of DFI's magazine, *Deep Foundations*. After its initial public release in 2013, the EFFC/DFI Carbon Calculator has helped the geotechnical industry quantify and reduce embodied carbon. Here's to 10 more years of innovation and forward-thinking!

### Emission breakdown: Average results (based on samples studied to develop the methodology)





## Support Fluids (Christophe Justino)

The First Edition of the EFFC/DFI Guide to Support Fluids for Deep Foundations was published in April 2019. The aim of the Guide is to improve existing support fluid design, testing, and practices for deep foundation elements (drilled shafts/bored piles, load bearing elements and diaphragm wall panels). The First Edition identified areas of support fluid performance where research and development would benefit the industry. Before the Second Edition of the Guide could be published it was necessary to carry out an extensive Field Research Study (FRS) which has been funded with generous support of Sponsors (EFFC, DFI, contractors, consultants, and suppliers).

To date, a total of 16 sites have been tested (8 sites in Europe and 8 sites in the United States). Test sites have been carefully selected to cover piles and diaphragm walls deeper than 30 m (100 ft) using both polymer and bentonite support fluid.

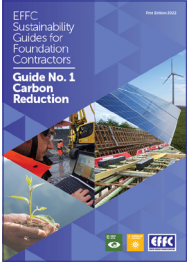
An important collection of data has been acquired by completing most of the test program from the FRS method statement. An online meeting was held in June 2023 to progress the work on analysing the data with the ultimate goal of publishing the FRS Report (including an analysis of data and a summary report for each site). In addition, the Task Group identified the sections of the First Edition that will be updated based on the findings and conclusions from the test program.

Analysis of the FRS results is being carried out by 8 working groups working on the different technical areas covered by the research program and the guide:

- **WG1:** Sampling tools (“fluid samplers”) performance and accuracy comparison
- **WG2:** Monitoring of support fluid properties in the trench
- **WG3:** Evaluation of non-standard test methods for support fluid properties
- **WG4:** Review of base cleaning data, and properties of the interface layer
- **WG5:** Tremie concrete test results and concrete levels during casting
- **WG6:** Filter cake build-up / soil softening post excavation investigation
- **WG7:** Sustainability - Environmental aspects of the use of support fluid for deep foundations
- **WG8:** Environmental impacts of support fluid - chemistry, ecotoxicity, regulation

Online and in-person meetings and work sessions will continue throughout 2024 with the target of publishing the Field Research Report and the Second Edition of the Guide at the end of 2024 or early 2025.

Site Reference	Support Fluid	Depth m	Depth ft	Volume m <sup>3</sup>	Volume yd <sup>3</sup>	Excavation Method	Main soil types
<b>Diaphragm Walls</b>							
EU2	Bentonite	32	105	290	380	Grab	Fine sand
EU7	Bentonite	40	130	270	350	Grab	Sand & Gravel
US1	Bentonite	30	100	240	315	Grab & Hydromill	Sand & Silty Clay
US3	Bentonite	48	158	300	390	Hydromill	Clay & Sand
US4	Bentonite	40	130	340	450	Grab & Hydromill	Silts & Shale
US6	Polymer	50	170	300	390	Grab & Hydromill	Clay & Sand
<b>Bored Piles</b>							
EU1	Bentonite	70	230	180	235	Bucket & Auger	Clay
EU3	Polymer	35-45	115-150	80	105	Bucket & Auger	Clay & Fine Sands
EU4	Polymer	45	150	115	150	Bucket & Auger	Clay & Sand
EU5	Polymer	35-50	115-165	30-45	52-59	Bucket & Auger	Sand & Clay
EU6	Bentonite	53	175	150	196	Bucket & Auger	Sand & Soft Clay
EU8	Bentonite	75	245	180	235	Bucket & Auger	Sand & Clay
US2	Bentonite	30	100	220	290	Bucket & Auger	Clay & Sand
US5	Polymer	50	170	350	460	Bucket & Auger	Clay & Sand
US7	Polymer	28	90	50	65	Bucket & Auger	Clayey Silt
US8	Polymer	55	175	230	300	Bucket & Auger	Clay & Silt



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# Sustainability Guides (Luke Deamer & Kimberly Martin)

## Guiding the way to a sustainable future

The EFFC/DFI Sustainability Guides Task Group is responsible for issuing guides that interpret how the geotechnical industry can practically use and apply the United Nations (UN) Sustainable Development Goals (SDGs). Sustainability is becoming more relevant to all our members as clients and governments worldwide are adopting policies and regulations that require more sustainable business practices, which include how we construct the built environment. These sustainability guides offer a practical take on how to apply sustainability in our industry by providing the How and the Why of sustainability, along with key actions and quick wins.

The next guides to be published will be the Second Editions of the Carbon Reduction Guide (SDG # 13) and the Circular Economy Guide (SDG #12). These are primarily based on the EFFC Guides of the same name. With the addition of DFI to the Task Group, these guides will now include sections that speak to how geotechnical designers can influence and improve their designs using a low-carbon and circular economy perspective.

To learn more about the circular economy, why it matters to contractors and hear case studies about these improvements, there is a free webinar on the 06 December 2023 14:00 CET. You can sign up for free here (<https://www.effc.org/webinars>).

The next set of guides will cover Water (SDG #6 and #14) and Well-being (SDG#3). Please contact Luke Deamer ([luke.deamer@keller.com](mailto:luke.deamer@keller.com)) or Kimberly Martin ([Kimberly.martin@keller-na.com](mailto:Kimberly.martin@keller-na.com)) if you would like to participate in developing these future guides.

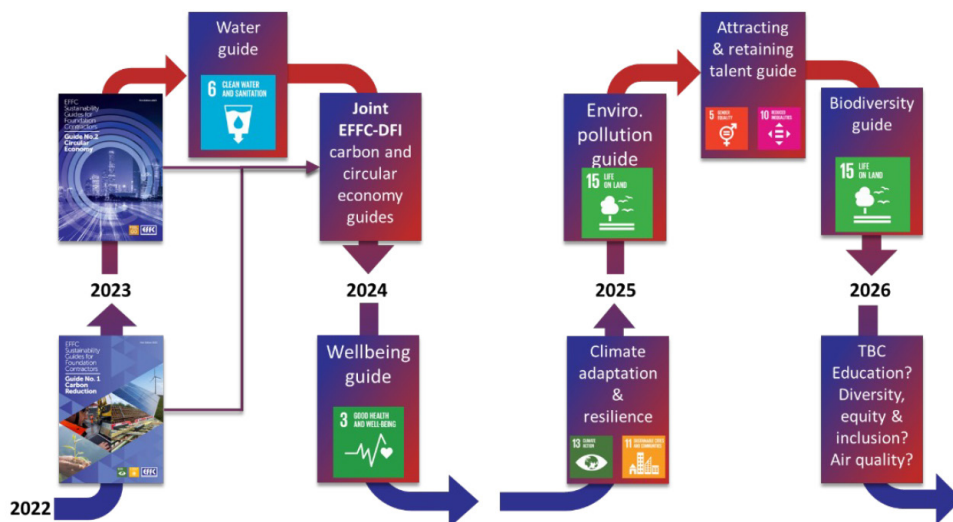
## Looking to the future

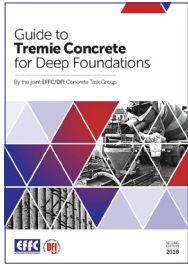
The European Union (EU) Corporate Sustainability Reporting Directive (CSRD) comes into effect in 2024. Reporting requirements start with all publicly listed companies in Europe, then spread to large companies in 2025 and then smaller companies in 2026-28. CSRD will require companies to understand what areas of sustainability are most material to their businesses. Broadly though, it requires reporting on carbon emissions, climate adaptation / resilience, circular economy, environmental pollution, biodiversity and water use. This is why the EFFC/DFI sustainability guides focus on these topics.

Several new directives are proposed in the United States, including the Securities and Exchange Commission (SEC) Reporting Regulations, the Federal Buy Clean Initiative, and the Federal Supplier Climate Risks and Resilience Rule, significantly increasing the sustainability reporting requirements for companies operating there. The EFFC/DFI Guides can help companies understand how to comply with these new rules.

At the beginning of this year, EFFC launched a voluntary company carbon reporting initiative. With the upcoming legal requirements in Europe, this initiative aims to help smaller members calculate their emissions. Through a simple online form, contractors can use their fuel and electricity use data to calculate their direct (Scope 1) and indirect (Scope 2) emissions. This carbon reporting also helps baseline the sector's emissions, as well as helping companies see how their emissions compare to other anonymised companies. It is planned for DFI to join this voluntary initiative in 2024/2025.

### EFFC/DFI sustainability guides task group roadmap





# Tremie Concrete (Karsten Beckhaus)

## Third Edition in preparation

Concrete placed in submerged conditions in deep foundations (bored piles and diaphragm walls) using the tremie method requires very specific and demanding properties, and proper mix design is critical to the quality of the end product.

The EFFC/DFI Tremie Concrete Task Group (CTG) has resumed its work and is committed to improving the EFFC/DFI Guide to Tremie Concrete for Deep Foundations which was published as a Second Edition in 2018. Since then, existing standards and specifications have still not been completely harmonized with the state of the art, in particular regarding tremie concrete and performance based specifications and testing.

The CTG has now been reinforced with additional experts from the United States, Canada and the United Kingdom and this combined Task Group (CTG III) is now working on the Third Edition of the Guide. This will strengthen and amplify the recommendations given in the Second Edition, as well as reduce the amount of testing required wherever possible.

A new Sub-Group, working under CTG III, has been established and this is chaired by Chris Wilkes. This group will give advice on how

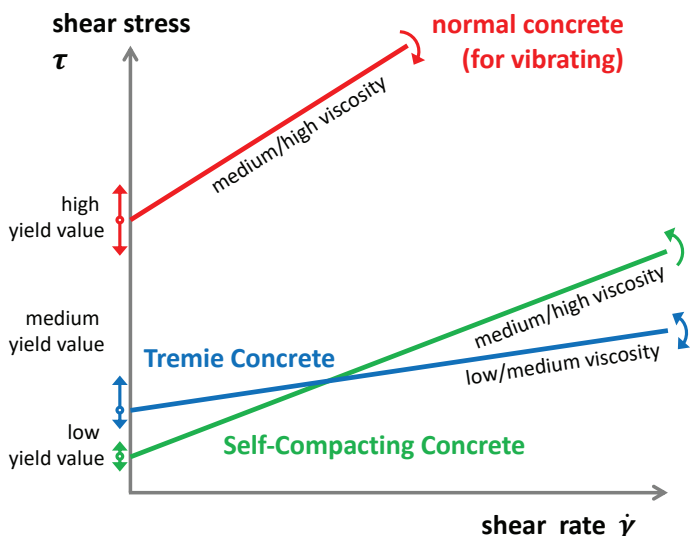
to optimise the casting process based on numerical modelling establishing the sensitivity of the most critical parameters.

Development of sustainable concrete is critical for the industry to reduce its carbon footprint. Low carbon cement is being worked on throughout the World. The Third Edition will tackle the indisputable need to concentrate on sustainability issues, but will balance the decarbonisation task with the need to deliver a final product of good quality where the performance based approach of the Guide allows options for better sustainability when producing piles or diaphragm walls.

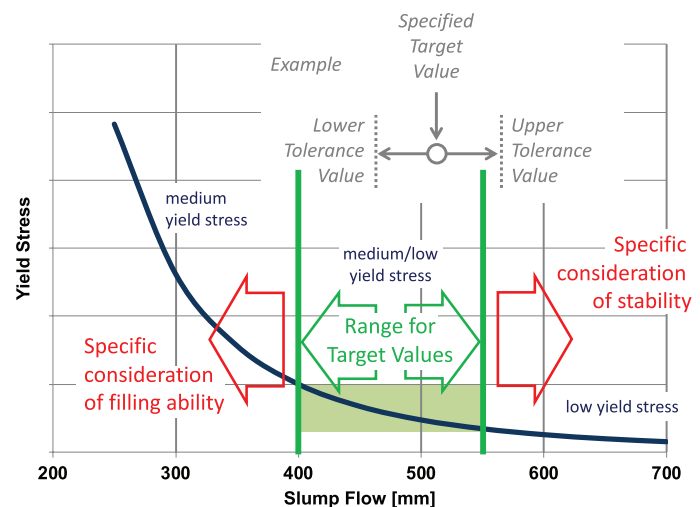
It is seriously hoped that the recommendations given in the Guide (Second Edition and the new Third Edition) will be incorporated into existing Standards like European Norm EN 206, or the Federal Highway Administration (FHWA) publications, American Concrete Institute ACI 302 (Concrete), and ACI 336 (Drilled Shafts) in the United States which would contribute to developing a worldwide mutual understanding of good practice in tremie concreting.

The next meeting of CTG III will be held at DFI48 in Seattle on Tuesday 31st October 2023 (8-10:15 am PST). This meeting is open to all (in person or online). If you wish to attend, please contact: [TechActivities@dfi.org](mailto:TechActivities@dfi.org).

**FIGURE 6.** Qualitative comparison of rheology for different types of concrete



**FIGURE 11.** Slump flow curve related to yield stress and recommended range for tremie concrete





## Working Platforms (Peter Faust & Jim De Waele)



The EFFC/DFI Guide to Working Platforms was published in January 2020. The aim of the Guide is to provide practical advice to clients, designers, general contractors and the users of working platforms to ensure safe, maintained and cost-effective working platforms as part of the temporary works necessary for a project.

Before the Second Edition of the Guide can be published, we have three areas of study and field research that are progressing, with the aim to complete during the second half of 2024. The research comprises three parts:

1. Field tests on actual working platforms to evaluate the effectiveness of different soil testing methods.
2. The study or calculation of track pressure for different equipment types.
3. A comparison of the available design methods coupled with practical design approaches and validation in the field.

### Part 1:

We have been carrying out various comparisons of in-situ tests on platforms in Europe and the United States. DFI and EFFC purchased a variety of testing equipment, including: a Stitz probe, the Panda DCP, a Lightweight Deflectometer, and a more conventional plate load test. Work is ongoing to assess how practical these tests are on a working site, and also to derive some parameters that may be used in the design and subsequent verification of working platforms. This work continues and anyone that is interested in participating should contact EFFC or DFI.

### Part 2:

The second part, calculating the track pressures, involves the rig manufacturers. They are developing a table that can be used to promote the wider understanding of what these track pressures mean. There are several methods of calculating track pressure, and each produces different results (with different loaded areas and pressure distributions). What is vital is that the designer understands which track pressure output to use, and which design method is then applicable to that output. This then becomes the subject of the third part.

### Part 3:

The University of Stuttgart is investigating the different methods of platform design that are currently available. When starting the project, it was decided to ask about a dozen designers to decide the thickness of a working platform for a given set of ground conditions. The results varied widely (by a factor of three) and at least five different calculation methods were used. It is this inconsistency that we want to avoid. The researchers will therefore be working on part of the Guide that describes the differences between the various methods, the proper input parameters, appropriate factors of safety and then the validation results that can then be used with one or more of the field tests described in Part 1.

In summary, we are making progress in developing better guidance. It is surprising that for something so simple, but so vital as a working platform that the subject is so complicated. We hope that the Second Edition will assist in improving the industry's understanding of how to properly design, install, test and maintain a working platform for the benefit of all.