*To whom in may concern:*

# PROPOSAL FOR PRESENTATION

**Venue:** The 55th National Amenity Arboriculture Conference
**Proposed by:**


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**Date:** April 8, 2022
**Presenter:** Martin Tušer
**Time required:** 40 min
**Language:** English

**Working name: WE CAN'T PLANT OUR WAY OUT OF THE CLIMATE CRISIS**

**Field – key words:** carbon capture and storage, city climate change resilience and mitigation, urban trees, heat island, zero carbon strategies, adaptation strategies
**Presentation content:** app. 70% scientific, 29% strategy and implementation, 1% commercial (if possible)

**Importance:** top priority new scientific facts, which must influence adaptation strategies to climate change based on new scientific evidence on topic of large tree carbon storage

**Target group of the message:** top level decision makers around the world capable to influence sustainable development and climate change adaptation strategies, especially in urban areas

**Background:**
In October 2020 a new study (1) has been published by a team of the world leading scientists including William R. Moomaw, the Professor Emeritus of International Environmental Policy at the Fletcher School, Tufts University. He is a lead author of the Nobel Prize-winning Intergovernmental Panel on Climate Change.
*"The recent study examining carbon storage in Pacific Northwest forests demonstrated that although* ***large-diameter trees (≥ 21 inches) only comprised 3% of total stems, they accounted for 42% of the total aboveground carbon storage.*** *The researchers highlight the importance of protecting large trees and strengthening existing forest management policies so that large trees can continue to sequester carbon and provide valuable ecosystem services as a cost-effective natural climate solution in worldwide forest ecosystems."*

I consider these presented results as a groundbreaking change in view to climate change adaptation strategies. In the context of strategies for urban areas the new information is strengthen by other ecosystem services of trees and the huge difference by amount of services provided by large trees compared to young or small trees to general public. The dependence can be observed in other ecosystem services as well.

Based on the above mentioned information I published a paper (2) answering a simple question: how many trees I have to plant to replace benefits provided by one large tree, which was felled down. William Moomaw (the co-author of the study (1)) connected me with a member of his team, Robert Leverett, who is an expert on calculating amount of carbon stored in trees. And together with Robert we came to alarming results. To replace one 30-meter in height, 1,3-meters in diameter oak, which stores almost 7 tons of carbon, we have to plant app. 3068 of trees usually planted in cities (5-cm in

diameter, 3-meters in height). If the newly planted trees are smaller (usually of size planted in suburbs, extra-urban areas or as fruit trees), the number skyrockets to 48 061 trees with necessity of 0% mortality rate!

The numbers given above do not include the following carbon footprints:

- Seeds collection
- Planting in nursery
- Planting to the final stand including transport
- Aftercare including watering
- Logging, transport and processing of the large tree.
- Carbon footprint of all necessary items needed to rise, plant and care of the new trees.

On top, if the original large tree is burned, it means that the carbon stored on the tree is emitted into the atmosphere, the numbers must by doubled to get the same effect as the large tree continues in grow.

There are other sources of evidence that, time wise, the large trees are more efficient in storing carbon in time, simply briefed the same amount of large trees can capture dramatically more carbon then the small ones in let's say e.g. in one year.

Quick comparison of CO2 sequestration of selected tree sizes by type according to their grow:

Carbon newly sequestered in 1 year, converted to CO2 equivalent at a ratio of 1:3.664. These figures refer to the red oak (Quercus Rubra) species, calculated on the basis of the FIA-COLE model by Robert Leverett:

A LARGE TREE we have already in a city: Age approx. 100 years, height 30.48 m, trunk diameter (DBH) 136 cm.

| Grow rate variant | CO2/ kg sequestered in 1 year | Incremental grow of DBH/ mm | Incremental grow of height / m |
|---|---|---|---|
| **1** | -859,7 | 0 | -1,00 |
| **2** | 101,50 | 1 | 0,03 |
| **3** | 211,9 | 2 | 0,07 |
| **4** | 364,1 | 4 | 0,07 |
| **5** | 390,20 | 4 | 0,10 |
| **6** | 477,10 | 4 | 0,2 |
| **7** | 728,1 | 5 | 0,4 |
| **8** | 1487,8 | 8 | 1,00 |

A NEWLY PLANTED TREE: Age about 7 years, height 3 m, trunk diameter (DBH) 5 cm. This size corresponds to standard trees planted in cities. NOTE: newly planted trees do not grow much after planting in urban areas

| Grow rate variant | CO2/ kg sequestered in 1 year | Incremental grow of DBH/ mm | Incremental grow of height / m |
|---|---|---|---|
| **1** | -0,37 | 0 | -0,2 |
| **2** | 0,51 | 1 | 0,03 |
| **3** | 1,08 | 2 | 0,07 |
| **4** | 2,17 | 4 | 0,1 |
| **5** | 2,42 | 4 | 0,2 |
| **6** | 2,92 | 4 | 0,4 |
| **7** | 3,5 | 5 | 0,4 |
| **8** | 7,34 | 8 | 1,00 |

From these numbers is clear that, in case of CO2 sequestration and storage the large trees are unbeatable and we cannot replace their function by any replacement planting of new trees. But that's not all:

**There is another study (4), which confirms the above mentioned data.**
The study calculates the age at which a tree changes from being a carbon emitter to being carbon neutral after planting in a city (Chicago). Despite the fact the planting material was transported only from 62 km distant nursery, the breakeven point is 26 to 33 years, depending on aftercare scheme. If we consider that tree saplings are usually transported from bigger distances (1000 km is quite common in Czechia), this is another confirmation that fighting against climate change via planting trees is a misleading believe.

Planting initiatives are very important, but they often just serve as an excuse to cut down big trees or as an indulgence to the world that we are doing something for the climate. Yes, we are, but it is for the future, not for the next 30 years, which are critical to mitigating the impacts of climate change. Moreover, planting initiatives are often unsuccessful for a variety of reasons. As a result, the lifespan of trees in cities, according to various sources (3), is 7-28 years, which is very short and does not give trees the chance to deliver the ecosystem services they could.

An interesting insight of what is going on in planting activities which are now taking place are opinions of a person, who stands at the beginning of tree planting all over the world: Prof. Dr. Thomas Crowther. Now he admits, although he and his team never intended, the communication mistakes of their work from 2016 resulted damages, because planting trees became a simple solution to beat the climate change. I recommend listening to the TED video from 2020 https://www.ted.com/talks/thomas_crowther_the_global_movement_to_restore_nature_s_biodiversity/transcript and TED podcast from 2021: https://podcasts.apple.com/us/podcast/can-planting-trees-really-stop-climate-change-thomas/id1437306870?i=1000524907297

**Suggested solution during below-the-average rainfall periods:**
App. 70% of the problems with urban trees is caused by lack of water (5). There are different solutions how to approach the problem but the most easiest and cheapest is just simply water the suffering current large trees in cities.
The important role in this process is deep knowledge HOW and WHEN the trees should be watered. We developed a set of tools and a method named TREEIB®, which can be important part of solution of the large trees problem in cities safely, efficiently and in large scale. It is already used in different cities around Europe.
A side effect of large tree watering: the watering can be combined with custom-to-site made fertilisation via liquid watering solutions or pollutant removal via watering liquid. This combination can solve app. 90% of all urban tree problems.

**Conclusion:**

- The planting initiatives are important but care of the currently growing large trees we have, especially in urban areas, is the key for make cities liveable and store carbon as much as possible and for low price.
- There is a proven solution for cities to deal with the problem.
- Carbon sequestration rate and other ecosystem services likewise are directly proportional to the tree biomass incremental grow, but ecosystem services provided by large trees are disproportionally bigger than newly planted trees.

**Objective of the presentation:**

- To inform about the new scientific findings and put them into context of the current urban planning and tree management.
- Open a discussion with professionals
- Help professionals to implement the information to their day-to-day business and intensify climate change mitigation
- I can include results of our large tree watering method testing and provide step by step instructions how to water a large tree. It covers an experience from 4-years testing and observations. The method prevents loss of tree stability due to shallow rooting or limitation of root growth, but essentially the opposite.
- I can include a topic of promoting healthy tree biomass grow via maximizing correct physiological grow cycle of the tree. Our results are briefly demonstrated at https://www.treeib.com/results-of-large-tree-watering

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(1) Mildrexler David J., Berner Logan T., Law Beverly E., Birdsey Richard A., Moomaw William R. (2020). Large Trees Dominate Carbon Storage in Forests East of the Cascade Crest in the United States Pacific Northwest , USA. Frontiers in Forests and Global Change, 3/2020, PAGES=127, https://www.frontiersin.org/article/10.3389/ffgc.2020.594274
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(2) Leverett Robert, Tušer Martin. (2021). WE CAN'T PLANT OUR WAY OUT OF THE CLIMATE CRISIS. Website publication www.treeib.com.
https://www.treeib.com/carbon-storage-in-trees-metric-robert-leverett in metric units
https://www.treeib.com/carbon-storage-in-large-trees-by-robert-leverett in imperial units

(3) Roman, Lara & Scatena, Frederick. (2011). Street tree survival rates: Meta-analysis of previous studies and application to a field survey in Philadelphia, PA, USA. Urban Forestry & Urban Greening - URBAN FOR URBAN GREEN. 10. 269-274. 10.1016/j.ufug.2011.05.008.
https://www.researchgate.net/publication/238003598_Street_tree_survival_rates_Meta-analysis_of_previous_studies_and_application_to_a_field_survey_in_Philadelphia_PA_USA

(4) Aaron C. Petri, Andrew K. Koeser, Sarah T. Lovell, Dewayne Ingram; How Green Are Trees? — Using Life Cycle Assessment Methods to Assess Net Environmental Benefits. Journal of Environmental Horticulture 1 December 2016; 34 (4): 101–110. doi: https://doi.org/10.24266/0738-2898-34.4.101

(5) Körber, Klaus. (2021). In the future, the saving of older trees will become much more important for our society. Website publication www.treeib.com.
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