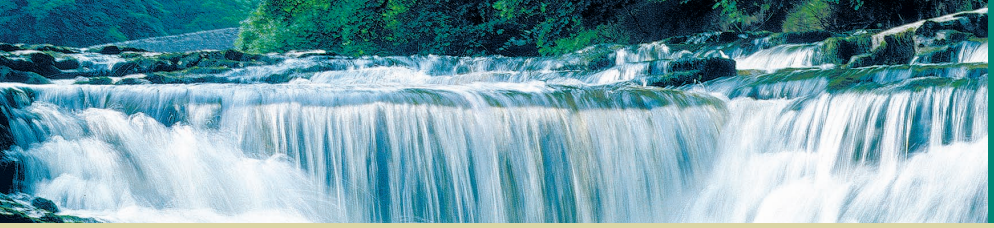

umberto® for Carbon Footprint

CREATING SUSTAINABLE VALUES: EVALUATING VARIOUS METHODS FOR PIPE LAYING WITH UMBERTO FOR CARBON FOOTPRINT

THE TASK

Determine the carbon footprint of laying a wastewater line: a comparison of two scenarios
The Warsaw city water works is expanding its wastewater system with a new, 3 m diameter line that will connect an entire city district to the Czajka wastewater treatment plant. The plant, with the future capacity to treat wastewater from 2 million residents, is one of the most important environmental protection projects in Europe. The job is highly complex: the new sewer tunnel will cross a main train line, several other wastewater lines and pass within 60 cm of the Warsaw subway. An environmental study is being conducted by HOBAS and GSTT (German Society for Trenchless Technology) to examine the different CO_2 emissions connected to two methods of laying new pipeline: working in an open trench versus trenchless approaches such as pipe jacking. In order to solve the problem, HOBAS opted to use Umberto for Carbon Footprint and, for the first time, to systematically analyze the environmental impacts of its own projects.

STRATEGY AND IMPLEMENTATION

The first segment of the new sewer line has a length of 5,714 m and will be driven along the right side of the Weichsel River and also along a six-lane main traffic artery. In order to evaluate its carbon footprint, all emissions, including those from transportation, that occur due to this construction phase will be taken into account, from the upstream chains of production to the pipe manufacturing process itself to, finally, the actual laying of pipe, both open trench and trenchless. Umberto for Carbon Footprint models and compares each approach, step by step. Even adverse impacts resulting from traffic back-ups or detours are to be reviewed.

Three data sets are specifically relevant for the calculations:

- The CO_2 emissions originating at the production sites and upstream chains. This data is collected by the company's own production and logistics departments.
- CO_2 emissions at the construction site generated by construction and related transportation activities. These data sets are taken from the Polish "Catalogue of Capital Expenditures" (KNR).
- CO_2 emissions from traffic on the 6-lane main highway, along which the pipeline runs for about 2.5 km. The necessary data will be collected directly at the site through two comparative measurements, taken during construction and after its completion.

CO_2 analysis of the production process
The HOBAS products used in the project are mainly composed of glass fiber, polyester resin, mineral-based reinforcements and additives. The main focus during production is efficient use of raw materials and reduction of waste. During the manufacturing process, the material input for each production phase is precisely regulated and recorded. A large part of the energy used during the production process is recycled.

CO_2 analysis during the installation process

Trenchless installation
The model for the trenchless installation analyzes four process steps: shaft preparation, drainage, driving and laying the pipe, and the handling of on-site vegetation.

THE CLIENT

HOBAS Engineering GmbH is a leading manufacturer of high quality, glass fiber reinforced plastic (GRP) pipe used in applications such as drinking water, wastewater, waterpower lines, cooling lines, watering and drainage systems. The company encompasses a network of 35 HOBAS-owned production sites and distribution centers located in Europe, Asia, Australia and the America. Its motto is, "HOBAS. Make things happen."

IMPORTANT UCF-FUNCTIONS

- Fulfilling PAS 2050, the GHG Protocol Product Standard, and ISO 14067
- ecoinvent database related to upstream chains
- Comparative modeling of different scenarios
- Easy integration of additional data sets

From an access shaft, the pipes are driven horizontally into the soil. The smooth surface and the light weight of the pipes – compared to the materials used by other manufacturers – require far less driving power. This leads to a lower energy demand and thus lower costs.

Open trench installation
Modeling the open trench installation relies on key data obtained from the KNR. The model breaks up the installation into five process steps: preparation of the trenches, drainage, the actual installation of the pipes and trenches, restoration of the damaged infrastructure, and the handling of on-site vegetation.

Traffic
Both the open trench and the trenchless pipe laying methods have an impact on traffic along the 6-lane main highway – albeit with differences in intensity and duration. Calculations for the trenchless method show a comparatively low impact of 300 days; the open trench method calculations show 350 days of impact. In each model, the results are based on best-case scenarios.

RESULT

The comparison indicates CO_2 savings of more than 350,000 tons for trenchless pipe installation compared to the conventional method - the equivalent of the annual emissions of about 100,000 cars. HOBAS is also applying the results of the carbon footprint comparison modeled with Umberto for Carbon Footprint to convince potential clients of the advantages of this climate friendly, sustainable installation process. An expansion of the analysis is planned that will include additional environmental impacts associated with the preparation and realization of large construction projects. This will be accomplished with the help of Umberto for LCA (Life Cycle Assessment).

APPLICATION EXAMPLES

CO_2 savings over the entire operational period
HOBAS pipes have a lifespan of more than 50 years. Corrosion and abrasion resistance prevent deposits and reduce maintenance costs to a minimum. The extremely smooth inner surface has a very low roughness coefficient, providing excellent flow qualities. As a result, less energy is needed to pump water through the system or, despite shallow gradients, pumps may be avoided entirely. In addition to the economic advantages, this also minimizes the use of resources and lowers CO_2 production during the entire useful life of the product.

Substitution of fossil fuels
Reduction of resource use and recycling are of great economic and ethical interest to HOBAS. Currently, their main focus is on recycling waste materials from the pipe manufacturing process. One possibility is to use the shredded material as an alternative fuel in the blast furnaces of cement manufacturing plants, thus replacing fossil fuel use.

New resources from recycled materials
Raw materials are carefully chosen and undergo a strict quality control process. As far as possible, resources derived from recycled materials are used. For example, close collaboration with a raw material supplier led to the development of a resin made from recycled polyethylene terephthalate (PET), which is ideal for long-term use in tough conditions and which improves the environmental life-cycle assessment of HOBAS products even further.

Quote

„During the past several months, HOBAS has made huge advances in the environmental sector. With Umberto for Carbon Footprint we can document how much CO_2 is saved in our production processes when compared to conventional methods. In addition, by analyzing the different scenarios, we can already identify at the planning stage how to further minimize CO_2 emissions."

Victor Vladimirov, Environment and Energy Management, HOBAS Engineering GmbH