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Dampflokotiv- und  
Maschinenfabrik DLM AG

# New paddle steamers for river and lake navigation

- ✓ CO<sub>2</sub>-neutral firing
- ✓ durable and sustainable
- ✓ Paddle wheel drive - ideal at low water
- ✓ cost-effective thanks to modular design

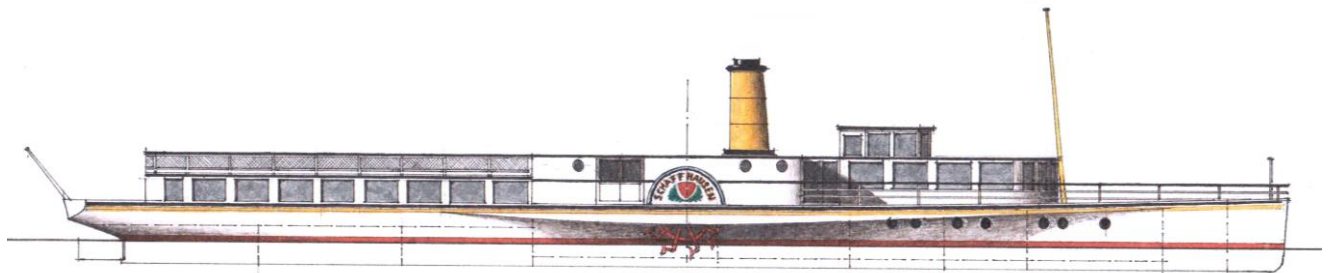
## International market analysis

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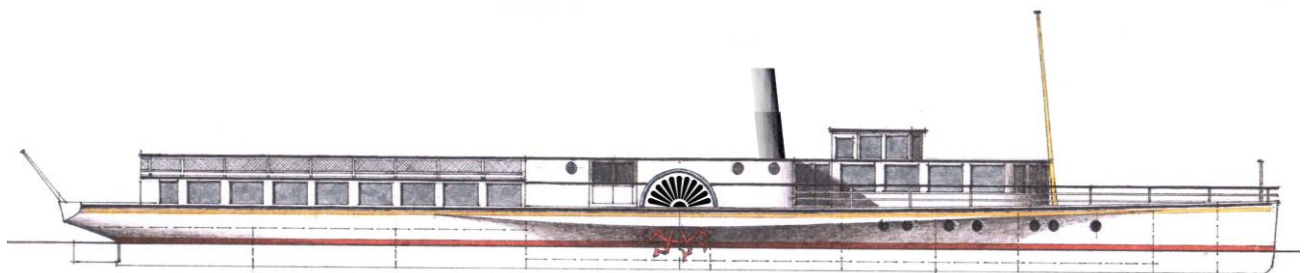
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### Keywords:

- New paddle steamer
- Climate change, CO<sub>2</sub> and low water
- CO<sub>2</sub>-neutral firing
- Modular concept
- Specifications, financing and schedule



Project drawing with modern funnel. Drawing Ueli Colombi



Project drawing with traditional funnel. Drawing Ueli Colombi, mod. DLM

## The actual situation challenges the shipping industry

Today, river and inland waterway shipping uses almost exclusively screw ships with diesel engines. The current discussions on climate change are putting increasing pressure on shipping companies to look for alternative propulsion systems. Replacing the diesel engines, which are produced in large series at low cost, is expensive and complicated. There is no patent solution that solves the CO<sub>2</sub> problem with a simple engine change.

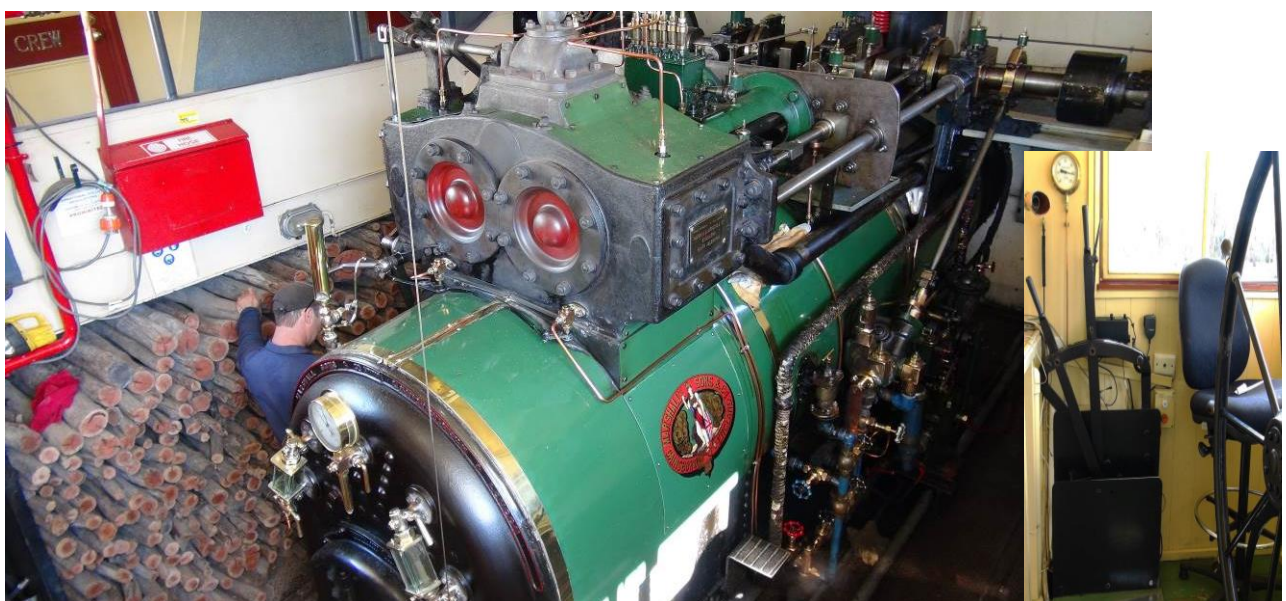
Another concern is river navigation, which is confronted with an increasing number of days when the water level is too low. In Dresden, the paddle steamers still sail for a long time at low water, while the motor ships stand still. With the old paddle steamer "Schaffhausen", service interruptions on the Upper Rhine were unknown. Now, replacement buses run there more and more often, not to the delight of the passengers.

## New paddle steamers with CO<sub>2</sub>-neutral firing system

Fortunately, there is a proven solution to these problems: the paddle steamer. In addition, the quiet and vibration-free paddle steamers increase the attractiveness of boat trips. And in terms of sustainability, the long-lasting steam technology, which does not contain any problematic metals or pollutants, cannot be beaten. Steam-powered means of transport are still in regular service after 150 years.

We are not proposing a rebuild of an old paddle steamer, but a new one with modern technology that meets today's regulations. Most of the historical paddle steamers needed a stoker and an engine driver, which makes operation more expensive than with motor ships. This disadvantage is due to age. Today's technology makes steamships possible without additional permanent engine staff.

Steam technology has the advantage that steam can be generated with any energy, a flexibility that internal combustion engines do not offer. Australian paddle steamers have always run on CO<sub>2</sub>-neutral eucalyptus wood. CO<sub>2</sub>-neutral operation with biomass was also common for steam locomotives and stationary steam engines.



**Pictures 1 and 2: The Australian paddle steamer "Emmylou" is fired by the stoker with eucalyptus wood (picture 1 in the left corner). The steam engine is operated mechanically from the wheelhouse (small picture 2 on the right). Photos Roger Waller**

## Modular Concept

To ensure that the new paddle steamers are also attractive in terms of price, at least six largely identical ships are to be built. Thanks to the modular concept, individual wishes can be taken into account and the ship can be given a shipping company-specific touch.

The basic construction consists of the streamlined hull, the efficiency-optimised paddlewheels and a lightweight single-deck superstructure. These main components are to be uniform for all new paddle steamers of this project.

The aforementioned advantage that steam can be generated with any form of energy should enable customers to choose the fuel that is most economical for them. Even though CO<sub>2</sub>-neutral operation is a main goal and the great advantage of this project, conventional fuels are also possible. This is to take account of the fact that the boundary conditions and cost structures are different in every country. The most economical solution in Switzerland is not necessarily the best option in countries with low labour costs.

The largely free choice of fuels is a major advantage of the modular concept. The following options are available:

- Automatic steam boiler: Pellet firing with burner
- Automatic steam boiler: oil firing with burner
- Steam boiler supervised by stoker: Lump wood firing by hand
- Hot-water high-pressure steam accumulator with external steam generator

We also want to offer customers various options for steam propulsion. The most attractive variant from the passenger's point of view is the classic, inclined, slow-running steam engine with direct drive of the paddle wheels. Alternatively, the paddle wheels can be driven by smaller, lighter, fast-running steam engines via reduction gears. The following options are available:

- a. Inclined, slow-running two-cylinder compound steam engine, exhaust steam condensation
- b. Inclined, slow-running two-cylinder steam engine (twin), exhaust steam without condensation through the chimney
- c. Horizontal, high-speed two-cylinder steam engine (twin), exhaust steam without condensation through the chimney, reduction gearing
- d. Vertical, high-speed two-cylinder V-steam engine (twin), exhaust steam without condensation through the chimney, reduction gear, single drive of the paddle wheels.

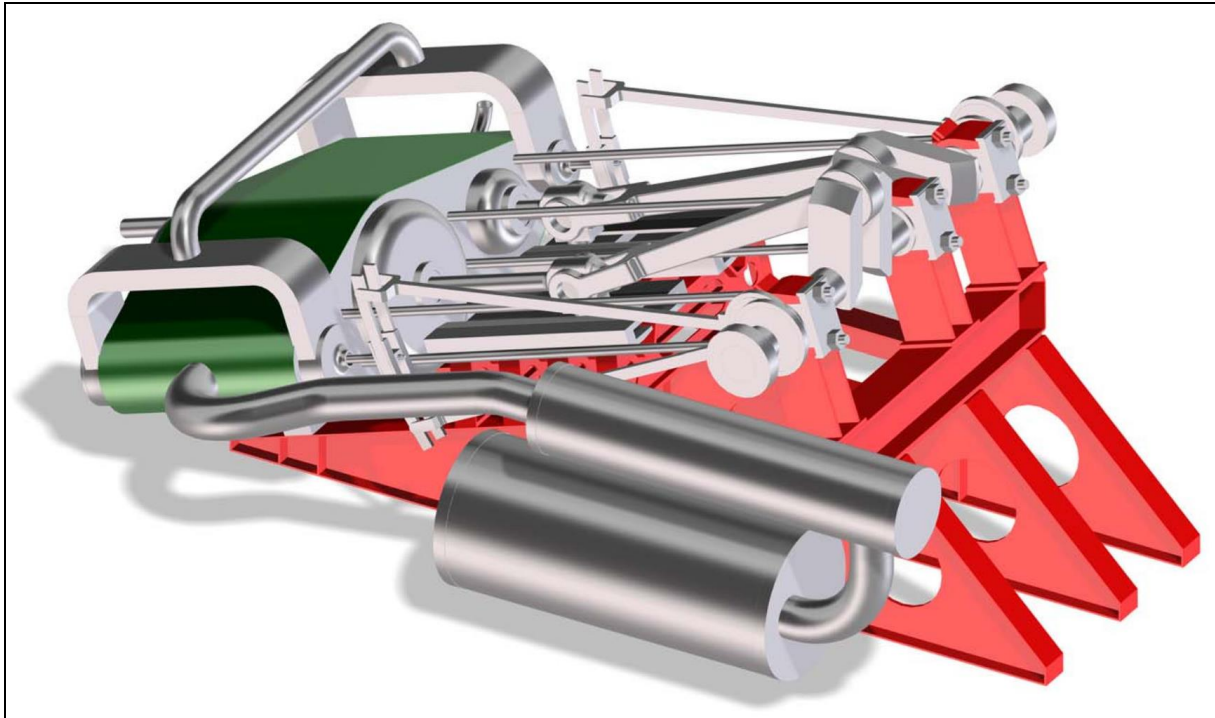
The boiler and steam engine variants mentioned can be selected as desired. There are no combinations that are not technically possible.

## Evolution instead of Revolution

Steam technology is wrongly considered outdated. In Germany, 70% of electricity is currently produced with steam processes. Steam technology is therefore constantly being developed further. This also applies to steam locomotives and ship steam engines, which have been newly built by SLM and its successor company DLM since 1990. The following illustrations show the respective state of development of the various steam engines. For more photos and films showing the steam engines in operation, see: [dlm-ag.ch/gallery](http://dlm-ag.ch/gallery)

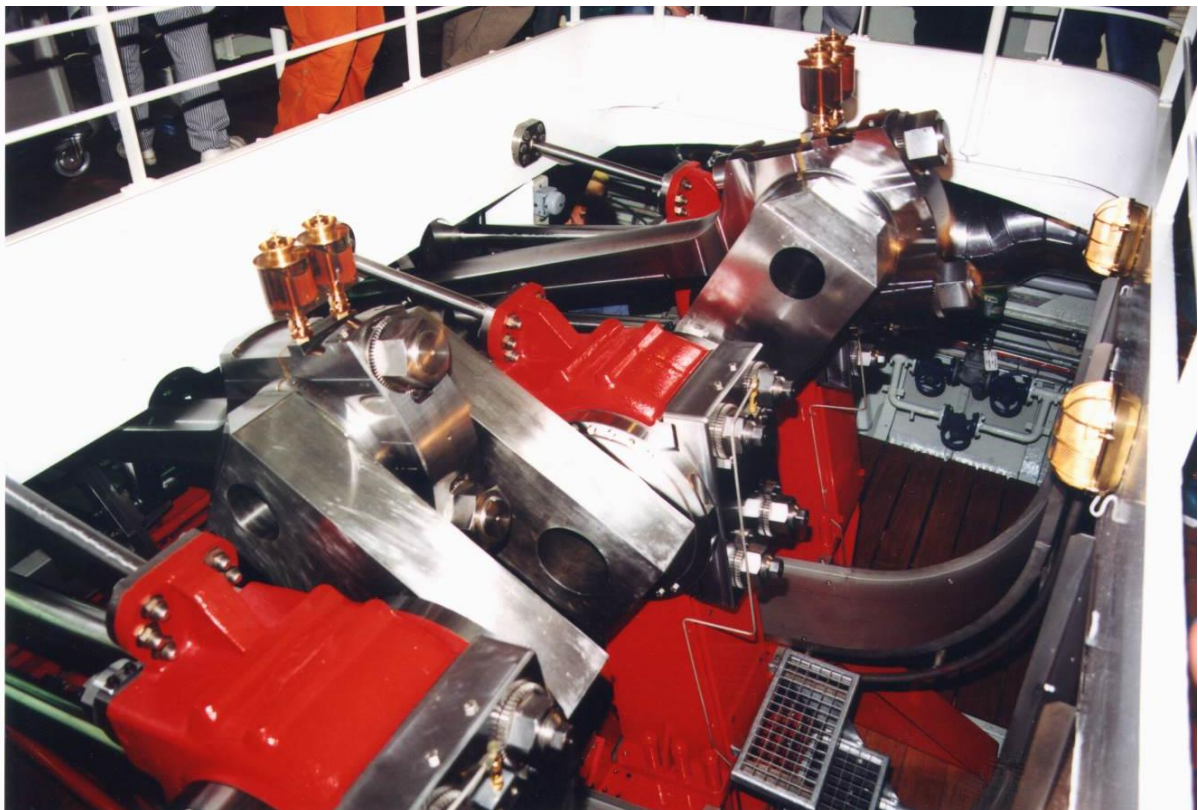


### **a. Inclined, low-speed two-cylinder compound Steam Engine**



Picture 3: Project drawing of the inclined, low-speed two-cylinder compound steam engine with exhaust steam condensation for the project of a new 300-passenger paddle steamer on the Upper Rhine. In addition, the thermo-dynamic calculations including the corresponding software for compound engines were made. Drawing DLM

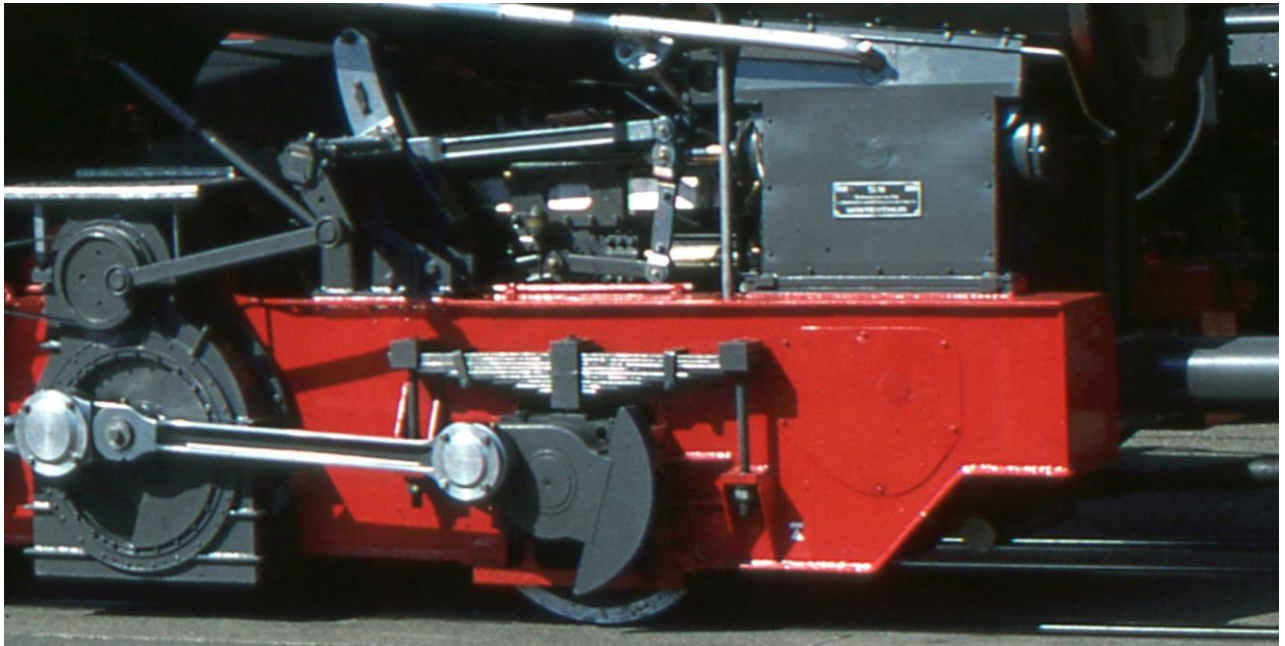
### **b. Inclined, low-speed two-cylinder Steam Engine (twin Engine)**



Picture 4: Inclined, low-speed two-cylinder steam engine (twin) without exhaust steam condensation. The 650 kW steam engine, newly built in 2000, with remote control from the wheelhouse, has since been in use on the Lake Geneva paddle steamer "Montreux". A scaled-down 200 kW version would be built for the project. Photo Robert Horlacher

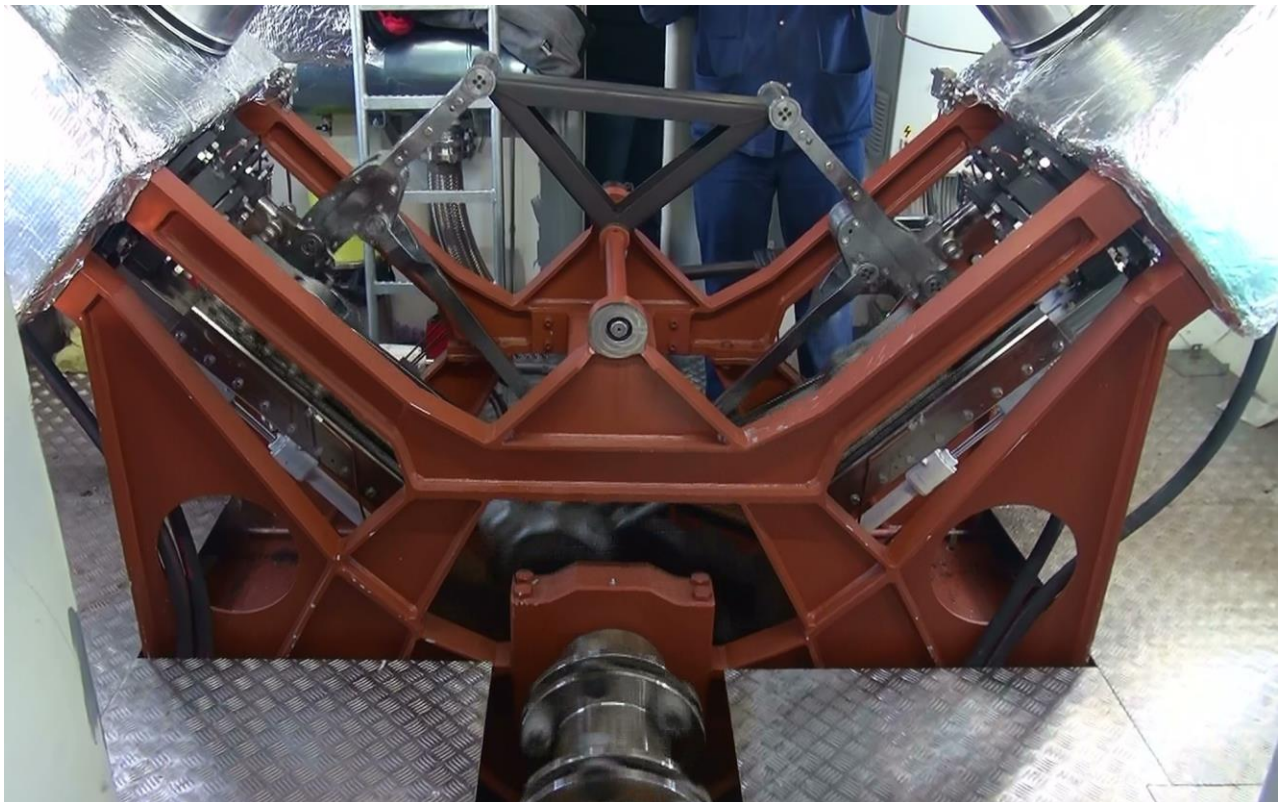


### c. Horizontal, high-speed two-cylinder Steam Engine (twin Engine)



Picture 5: Horizontal, high-speed two-cylinder steam engine (twin) without condensation with reduction gear. A total of eight of these steam engines were built for European rack railways in 1992 and 1996. For the use of these proven 300 kW steam engines on the paddle steamer, the two big wheels of the gear, would drive the paddle wheels simultaneously via cardan shafts on each side. Photo Roger Waller

### d. Vertical, high-speed two-cylinder V-Steam Engine (twin Engine)



Picture 6: Vertical, high-speed two-cylinder V-steam engine (twin) without condensation. This modern steam engine with an output of 100 kW, built in 2019, is in use on the Lake Thun screw steamer "Spiez". When used on a paddle steamer, two V-steam engines each drive the paddle wheels individually via a reduction gear. This would improve the ship's manoeuvrability. Photo Roger Waller

## Specification

By its very nature, a specification is provisional and incomplete at this early stage of the market analysis. Nevertheless, the basic features should be defined here:

### Technical project data for the basic version

• Type:	steamer with deck saloons
• Intended maximum carrying capacity:	300 persons
• Crew, without catering:	2 bis 3 persons
• Length overall:	55 m
• Width overall:	9,5 m
• Draught loaded:	0,90 m
• Empty displacement:	150 t
• Continuous power of steam engine:	250 kW
• Maximum power of steam engine:	300 kW
• Operating speed in shallow water:	24 km/h
• Test speed, empty:	27 km/h
• On-board power with soundproof diesel generator:	50 kW

### Equipment

The aim of the basic version is to have the lowest possible draught and the lowest possible fuel consumption. To achieve this, it is necessary to keep the weight as low as possible and to do without unnecessary equipment. What is not present has no weight, needs no maintenance and causes no disturbances. We therefore offer the following additional equipment as an option only:

- Open upper deck on the aft saloon
- Lowerable chimney
- Lowerable wheelhouse
- Bowside rudder (for canal cruising astern)
- Bow thruster
- Stern thruster
- Air conditioning for saloon
- Infrastructure for on-board entertainment
- CO<sub>2</sub>-neutral on-board power supply

### **Land-based infrastructure**

Paddle steamers with pellet firing do not require a permanent land-based infrastructure for fuel supply. This is in contrast to other technologies such as hydrogen or electric mobility. Pellets have excellent transport properties, comparable to liquid fuels. They can be transported quickly and efficiently up to 30 metres in an air stream. Like heating oil, they are pumped from the truck via a flexible hose into the storage tank. Unlike heating oil, there is no environmental hazard even in the event of a leak. Alternatively, pellets can be delivered in bags or big bags.

Wood pellets are mainly used for heating purposes in houses. The pellet demand of paddle steamers, which are mainly used in summer, is therefore anti-cyclical, which promises advantages in terms of price and delivery capacity.



Picture 7: Special lorry for wood pellets. These are pumped through the grey hose by compressed air.  
Photo archive DLM

## Financing

This market analysis and its evaluation is financed by DLM Ltd. The further steps require binding orders and down payments, the details of which will be announced in quotations. It should be noted that in some countries considerable subsidies are available for climate-friendly projects. Also from the private side, be it associations of steamship enthusiasts or wealthy sympathisers, à-fonds-perdu contributions in the millions can be expected.

## Schedule

If at least six new paddle steamers can be built according to this concept, the project engineering will be taken up quickly in cooperation with a renowned shipyard and in dialogue with the customers. We need one to two years for this work. For the construction of the paddle steamers, which can take place in local shipyards depending on the geographical location of the customer, another two years are estimated.

If the market analysis shows that the targeted number of six new paddle steamers will not be achieved, the project will not be realised in the planned form. There remains the possibility of an individual order at a higher price due to the lower number of units.

## Contact

If you are specifically interested in our project of the new 300-passenger paddle steamer with CO<sub>2</sub>-neutral operation, please contact us in writing or by telephone:

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