



ZAMBEZI RIVER AUTHORITY



THE KARIBA DAM REHABILITATION PROJECT RESTORING AN ICON





ZAMBEZI RIVER AUTHORITY



Constructed across the Zambezi River between 1956 and 1959 as a hydro-electric scheme to provide energy and support the economic development of Zambia and Zimbabwe, the Kariba Dam has played a significant role in Zambia and Zimbabwe and across the region for almost 60 years. Having done its duty well, the dam now requires rehabilitation to ensure its long-term efficient operation into the future. The Zambezi River Authority, on behalf of the governments of Zambia and Zimbabwe, and with the financial support of the European Union, the African Development Bank, the Swedish Government and the World Bank, embarked on the Kariba Dam Rehabilitation Programme in 2015. We are confident of its successful completion in 2025.

Eng. Munyaradzi Munodawafa
Chief Executive Zambezi River Authority



KARIBA DAM REHABILITATION PROJECT IMPLEMENTATION STEPS



ZAMBIA



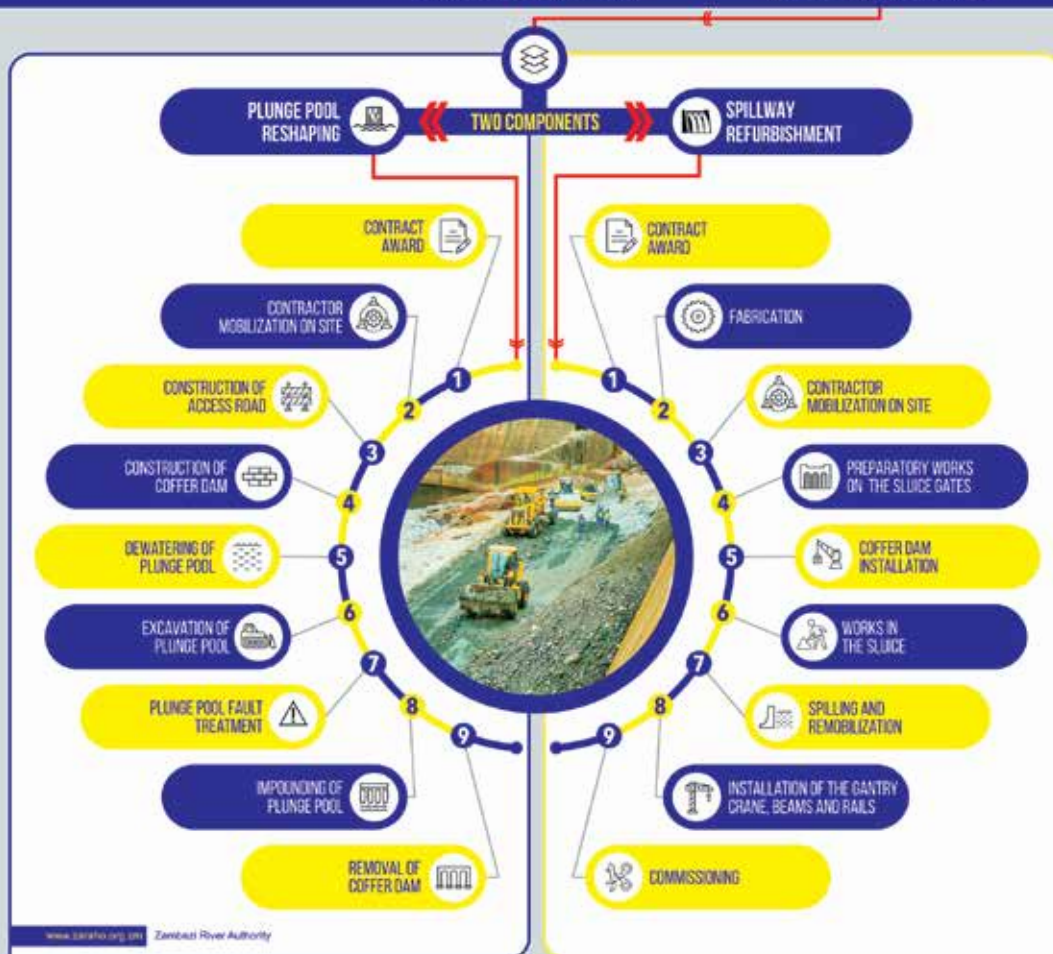
ZIMBABWE



FUNDERS/CO-OPERATING PARTNERS
EU/WORLD BANK/GOVT OF SWEDEN
AFRICAN DEVELOPMENT BANK



ZAMBEZI RIVER AUTHORITY
PROJECT IMPLEMENTERS/SUPERVISORS
ON BEHALF OF GOVERNMENT





THE KARIBA DAM REHABILITATION PROJECT — AN OVERVIEW

After 60 years of serving the people of Zimbabwe and Zambia, routine monitoring of the Kariba Dam has identified the need for rehabilitation works to ensure the dam's longevity and its continued contribution to energy security and economic prosperity in the region.

The Kariba Dam Rehabilitation Project (KDRP) comprises the reshaping of the plunge pool to limit the scouring and erosion of the natural rock floor of the plunge pool, and the refurbishing of the spillway gates to secure the dam's operations in accordance with international dam safety standards.

Large scale engineering works like the KDRP take several years and the KDRP is no exception to this. From the start of the planning, funding mobilisation and procurement process to the completion of the works, the KDRP will take ten years taking into account the need to continue operating the dam safely with minimal interruptions to power generation during the rehabilitation project.

The plunge pool reshaping commenced in February 2017 with the construction contract signing ceremony and according to the current project programme, the KDRP will be com- ➤

The KDRP – safeguarding the longevity of the Kariba Dam to guarantee a continued supply of electricity and contribute to the economic and social development of Zambia and Zimbabwe and the southern African region.

pleted in 2025 when the rehabilitation of the spillway gates is completed.

The \$294 million project is being funded by the European Union, World Bank, African Development Bank, the government of Sweden and the Zambezi River Authority on behalf of the governments of Zambia and Zimbabwe, through a combination of grants and loans. ■



Plunge Pool Contract Signing – EU Ambassador, Zambian Treasury Secretary and Contractor

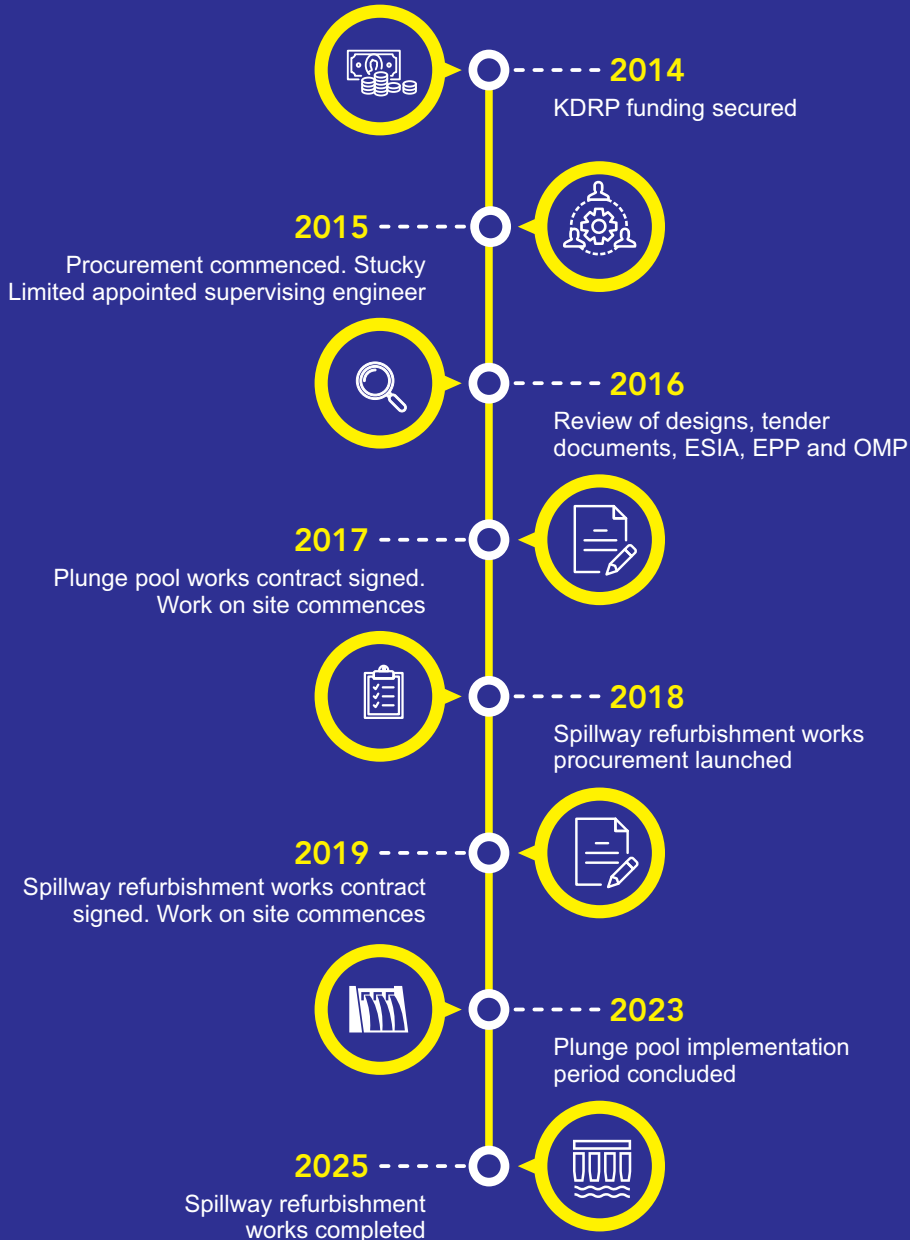


Plunge Pool Contract Signing – Zambezi River Authority CE delivers plunge pool overview

“If you want to go fast, go alone. If you want to go far, go together.”
- African proverb

The Kariba Dam Rehabilitation Project is a fine example of collaboration among the funding partners – the World Bank, the African Development Bank, the Government of Sweden and the European Union, the governments of Zambia and Zimbabwe and the Zambezi River Authority. Working together, has made the KDRP possible.

KDRP TIMELINE





RESHAPING THE PLUNGE POOL

The natural river bed downstream of the dam has eroded over time as a result of the heavy spillage of flood waters, particularly in the dam's early years, to form a deep plunge pool.

The Zambezi River Authority has monitored the performance of the dam infrastructure, including the plunge pool, since its impoundment in 1958. The unit has implemented routine interventions to slow the expected erosion of the plunge pool's natural rock floor. This includes controlling the volume of spillage by opening fewer of the sluice gates at a time. The construction of the second power station in the late 1970s also reduced the spillage as more water was diverted for power generation than before. As a result, the natural erosion has slowed and no significant changes to the plunge pool floor have been recorded in the last 15 years.

However, the Zambezi River Authority and independent consulting engineers in their routine

monitoring of the dam infrastructure, have recommended rehabilitation works to the plunge pool to enhance its stability and prevent further deepening and backward scour towards the dam foundation.

WHY RESHAPE THE PLUNGE POOL?

Excavating the downstream end of the plunge pool will increase its size and reduce the pressure that the water spilling into the plunge pool exerts on its base thereby slowing the erosion of the natural rock floor.

Reducing the slope of the downstream end of the plunge pool will decrease the amount of swirling and ensure the smooth flow of water out of the pool and into the river.

Reinforcing the wall of the plunge pool will >>

The reshaping of the plunge pool of an existing dam is a world first.

strengthen and stabilize it.

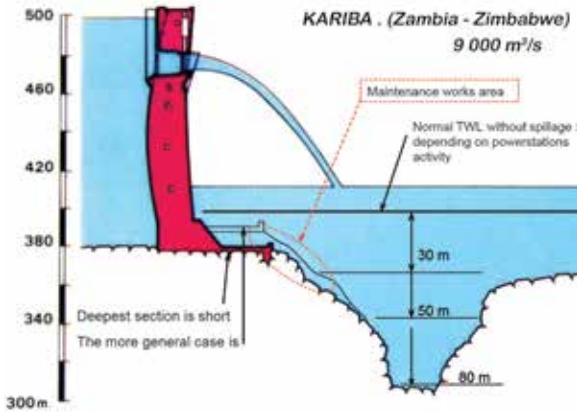
WHAT DO THE PLUNGE POOL WORKS ENTAIL?

The works on site, which follow the procurement and documentation phase of the project, include: site installation; the construction of permanent and plunge pool access roads; the construction of a coffer dam and dewatering of the plunge pool; the excavation works and fault treatment; refilling the plunge pool and the demolition of the coffer dam on completion of the works.

The plunge pool reshaping will be completed in approximately three years.

WHO IS FUNDING THE PLUNGE POOL?

The plunge pool reshaping is wholly funded by the European Union through a €64 million grant to the Republic of Zambia. ■



*TWL: Tail water level

Plunge Pool Reshaping with upstream strengthening of fault zone



Head of EU Infrastructure Development Adam Grodzicki (c) and Contractor tour KDRP site



Road overlooking plunge pool project site from Lake Kariba North Bank

The two underground hydropower stations at Lake Kariba generate more than 10,035 GWh of electricity for each year, making Lake Kariba the largest provider of electricity to Zambia and Zimbabwe.



REFURBISHING THE SPILLWAY

The six sluice gates in the upper part of the concrete dam wall together form the spillway through which water is released into the plunge pool to manage the reservoir water levels.

Over time, concrete exposed to water expands. This minimal expansion is natural and is expected. However, expansion over a long period of time – as in the case of the Kariba Dam which is 60 years old - can affect the smooth opening and closing of the gates and possibly cause the spillway gates to jam in open position.

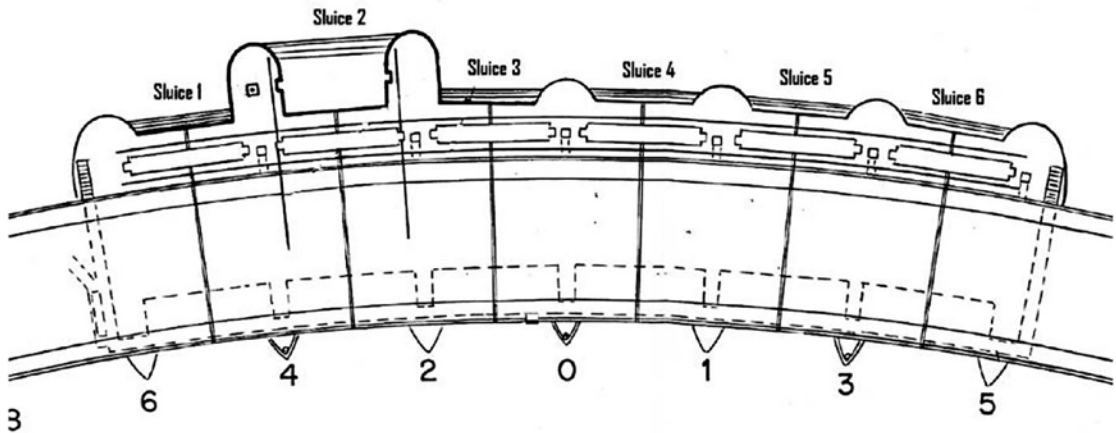
Since its impoundment in 1958, the Zambezi River Authority has monitored the performance of the dam infrastructure in accordance with the Standard Operations Procedure. This routine monitoring and management of the spillway system has resulted in the recommendation that the six spillway gates be refurbished to ensure their continued full operability in the long term. In addition,

external consultants who undertake five-yearly inspections of the dam's infrastructure, have also recommended that a movable back-up gate be installed on the upstream side of the dam wall as an additional safeguard to be used should any of the gates jam.



PLAN OF SPILLWAY

Scale 1/500



WHY REFURBISH THE SPILLWAY?

The spillway refurbishment will mitigate potential risk to the operation of the spillway and will enable the Zambezi River Authority to continue to manage the water levels in the reservoir effectively and guarantee the safety of the dam for many more years.

WHAT DOES THE REFURBISHMENT ENTAIL?

Following the procurement and documentation phase of the spillway refurbishment, the works will include fabrication; site mobilization; preparatory works on the sluice gates; the installation of a coffer dam to allow sluice works in the

dry; works in the sluice; spilling and remobilization; the installation of the gantry crane, beams and rails and commissioning.

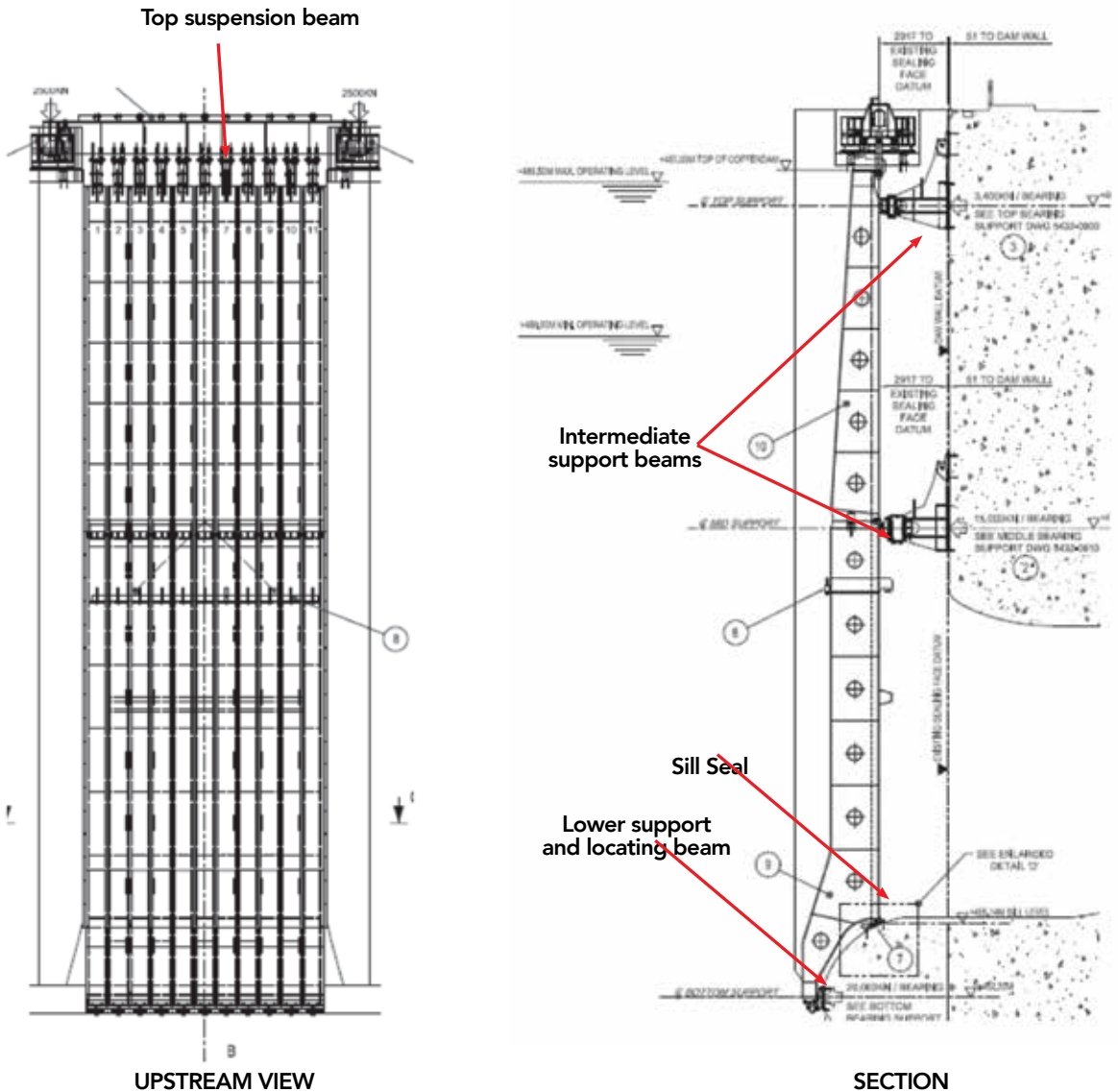
The spillway refurbishment is expected to take approximately five years. The procurement of the contractor to undertake the spillway works is underway with the appointment expected to be made towards the end of 2018 or early in 2019.

WHO IS FUNDING THE SPILLWAY REFURBISHMENT?

The works will be financed by the World Bank, the African Development Bank and the Swedish government through loans and grants to the Republics of Zambia and Zimbabwe. ■

The spillway rehabilitation ensures the continued safe, controlled and effective management of the Lake Kariba water levels and the continued hydrological safety of the dam.

SPILLWAY REHABILITATION: COFFERDAM CONSTRUCTION



Steel cofferdam suspended from beam to create a watertight workspace



Choompwe borehole (Zambia)



Hamatuba School (Zambia)



Chikuro Primary School (Zimbabwe)

INVESTING IN COMMUNITIES

Through the Zambezi Valley Development Fund, the Zambezi River Authority supports communities in the vicinity of the reservoir in both Zambia and Zimbabwe by investing in infrastructure like bridges to improve access, boreholes, schools and clinics.

SOCIAL, ENVIRONMENTAL AND ECONOMIC IMPACT

The plunge pool and spillway refurbishment will have minimal negative impact on communities and the environment in the region of the dam. Rather, the works will bring some benefits to local communities, creating jobs for unskilled and semi-skilled workers, ensuring skills and technology transfer, while the influx of people into the area will stimulate local businesses.

No people will be displaced or resettled as the works will be undertaken within the plunge pool area.

The works will not affect the flora and fauna in the vicinity of the dam and downstream of the works, or the quality of the water in the lake and downstream of the works.

IMPACT ON HYDROPOWER GENERATION



Power generated at Kariba supplies Zambia and Zimbabwe

The Kariba Dam Rehabilitation Project will not affect hydropower production at either of the power stations. Indeed, it will restore the Kariba Dam to full operability, contributing to energy security and expanded economic growth, prosperity and poverty alleviation in the southern African region. ■

DID YOU KNOW

**FACT
01**

The dam has the capacity to hold 181 billion cubic metres of water.

**FACT
02**

The Governments of Zambia and Zimbabwe have mobilized financing in the form of grants and loans from the African Development Bank(US\$75m), the European Union (EURO 64m), the Government of Sweden (US\$ 25m), and the World Bank (US\$75m) to support the ZRA 's implementation of the project.

**FACT
03**

For 60 years the Kariba Dam has been central to regional energy security and economic development.

**FACT
04**

Lake Kariba is the largest man-made reservoir in the world by volume. Measuring approximately 280 km from East to West and up to 40 km wide, it covers almost 5 600 square kilometres.

**FACT
05**

The North Bank Power Station is operated by ZESCO Ltd in Zambia and has an installed capacity of 1,080 MW.

**FACT
06**

The South Bank Power Station is operated by Zimbabwe Power Company in Zimbabwe and currently has an installed capacity of 750 MW, with projects underway to increase this to 1,050 MW.

**FACT
07**

The dam is a double curvature concrete arch dam, 128m high and with a crest length of 617m.

**FACT
08**

Jointly owned by the governments of Zambia and Zimbabwe, and managed on their behalf by the Zambezi River Authority, the Kariba complex is a fine example of bilateral cooperation between two sovereign states in the management of a shared watercourse.

**FACT
09**

The total cost of the KDRP works, which will take 10 years to complete, is estimated at US\$294 million.

**FACT
10**

Lake Kariba supplies water to two underground hydropower stations with a total capacity of 2,130 MW generating more than 10,035 GWh of electricity annually. It is the largest provider of electricity to Zimbabwe and Zambia.

**FACT
11**

The Kariba Dam Rehabilitation Project (KDRP) consists of two components: the reshaping the plunge pool and the refurbishment of the flood gates.

**FACT
12**

The Kariba Dam was constructed across the Zambezi River, the fourth largest river in Africa, between 1956 and 1959 and commissioned in 1960.







ZAMBEZI RIVER AUTHORITY



The Zambezi River Authority was established as a corporate body on 01 October 1987 by parallel legislation in the Parliaments of Zambia and Zimbabwe under the Zambezi River Authority Acts. Its mandate is to obtain the greatest possible benefit from the natural advantages offered by the waters of the Zambezi River for the economic benefit of Zambia and Zimbabwe. As the implementing authority representing the two governments, it operates, monitors and maintains the Kariba Complex and is responsible for the implementation of the Kariba Dam Rehabilitation Project.

For additional information on the Kariba Dam, please visit www.zaraho.org.zm or contact:

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