



High-Level Conference on:

Water for Agriculture and Energy in Africa: the Challenges of Climate Change

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National Investment Brief

ZAMBIA

EXECUTIVE SUMMARY:

Zambia portrays a very high level of undernourishment; one out of two persons is undernourished. Both the proportion and the number of undernourished people have increased from 1990-92, benchmark period of the World Food Summit (WFS) and the Millennium Declaration, to 1999-2001, the last period available. Nonetheless, the situation of the food import bill clearly improved in recent years: Zambia has always been characterized as a net food importer country, being its food imports clearly larger than its exports, but this trend inverted the first time in 1999 and the second time in 2004.

Most of the agriculture is undertaken on a small to medium scale basis (from 10 to 60 ha) characterized by rainfed farming. It is believed that between 523 000 ha (AQUASTAT, 2007) and 672 000 ha (WB, 2008) can be economically developed for irrigation. Currently 155 912 ha of land are irrigated in Zambia, which is about 30 percent of the economical irrigation potential and 3 percent of cultivated area. About 100 000 ha of non-equipped lowland areas are cultivated on river valley margins, around lakes and on dambos (areas of high water table found throughout the region) for flood recession cropping.

Zambia lies entirely within two large river basins, the Zambezi River basin and the Congo River basins, both shared with neighbouring countries. There are about 1 700 dams. The total capacity is about 200 km³ (including 188 km³ stored in three large dams - Lake Kariba, shared between Zambia and Zimbabwe, which accounts for 94 km³, Itezhi Tezhi and Kafue gorge dams). Zambia has an installed hydropower capacity of 1 670 MW and currently, the government is making progress in the preparatory works for the construction of Itezhi-tezhi and Kafue Gorge II hydro-power projects and is also exploring the construction of mini-hydro power stations in other areas.

The Governmental agenda in Zambia focuses on the development of an efficient and competitive agricultural sector that assures food security at both household and national levels and also maximizes the contribution of the sector to GDP. To realize this vision, Government has in the past three years prepared several documents to guide development in the sector. Moreover, the NEPAD-CAADP National Medium-Term Investment Programme (NMTIP) has two pillars for agriculture: (a) the empowerment of producers to increase productivity, and (b) influencing policy to change the role of public institutions.

The financial envelope for the investment strategy is estimated at 387 million US\$. Currently, there are twelve project profiles already prepared with a large water component that range from US\$1.2 million for a climate change adaptation project directed towards land use practices to US\$1.5 billion for the Kafue Gorge Lower Project. Amongst these projects, there is a Bankable Investment Project Profile for approximately US\$11 million with a large water component. Finally, nine recent and ongoing projects can be identified, ranging from about US\$11 million to about US\$315 million.

1. CONTEXT

1.1 AGRICULTURE AND FOOD SECURITY

Agriculture

The country's GDP was US\$11 363 million in 2007 and the value added by agriculture was 21.82 percent of the GDP in 2006. The sector has been given top priority. Eighty percent of the population is dependent on agriculture, which provides employment for about 70 percent of the labour force.

In rainfed farming, three four farmer categories are distinguished based on land size owned by a respective farmer: i) small-scale farmers owning up to 10 ha and cultivating about 2 ha. mostly food crop , ii) emergent commonly referred to as medium farmers owning 10ha and more produce a mix of food and cash crops; iii) large-scale, or commercial, farmers own more than 60 ha primarily producing cash crops. There are about 800 000 small-scale farmers and 200,000 constituting emergent farmers. There are 740 large scale farmers of whom 200 are using irrigation on a commercial basis (World Bank, 2008).

Irrigation and water control

Zambia's irrigation potential is 2.75 million ha based on water availability and soil irrigability. From this potential, it is believed that 523 000 ha can be economically developed, but other sources such as the World Bank report a higher value, 672 000 ha (2008).

Four categories of irrigated farming are found in the country. Informal irrigation by small-scale farmers who grow vegetables, rice, bananas and some local sugar cane varieties; smallholder irrigation schemes where vegetables; pineapples, etc are grown; parastatal schemes that produce specific crops for throughput to industry like coffee, bananas and tea; private or commercial irrigation schemes developed to grow high value commercial crops for export and local consumption (e.g. sugar cane).

Currently 155 912 ha of land are irrigated in Zambia, which is about 30 percent of the economical irrigation potential and 3 percent of cultivated area. About 100 000 ha lowland areas are cultivated particularly in the rainy season in the interfluvies, lakeshore margins and dambos (areas of high water table found throughout Zambia and the region).

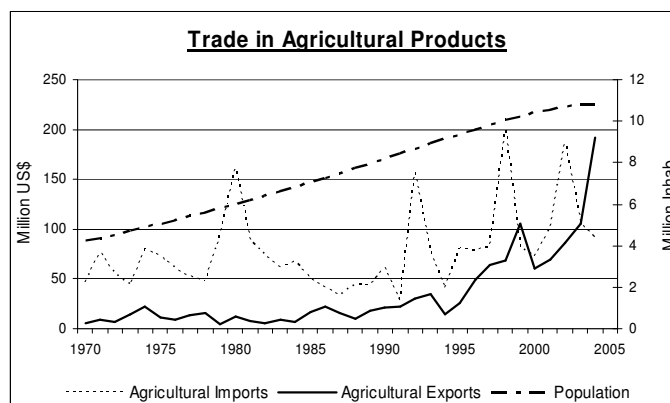
Food security

Zambia portrays a very high level of undernourishment; one out of two persons is undernourished. Both the proportion and the number of undernourished people have increased from 1990-92, benchmark period of the World Food Summit (WFS) and the Millenium Declaration, to 1999-2001, the last period available. Reduced crop production has been attributed to the heavy dependency on rainfed agriculture, which is unreliable due to severe droughts, and thus food deficits, particularly maize, frequently occur.

Food and agriculture trade and import balance

In 2004 the food import commercial bill of Zambia reached a value of US\$ 51 million. The agricultural imports increased over times, showing peaks in occasion of the draughts occurred in 1992-3 and 2002 and of the flood which affected the country in 1997-8. Zambia has always been characterized as a net food importer country, being its food imports clearly larger than its exports. In recent years, nonetheless, this trend inverted, the first time in 1999 and the second time in 2004.

The agricultural country's export potential is enormous, considering that it increased from US\$46.5 million in 1995 to US\$133.9 million in 1999 and exceeded US\$300 million (70% of this being sugar, cotton and tobacco) in 2005. Expansion of existing commercial irrigation and linked out-grower schemes have led to accelerated crop diversification and subsequent commercialization.



1.2 WATER RESOURCES AND HYDROPOWER

Zambia lies entirely within two large river basins, the Zambezi River basin and the Congo River basin, both shared with neighbour countries. The total renewable water resources of Zambia amount to about 105 km³/year, of which about 80 km³/year are produced internally. There are approximately 1 700 dams and many smaller ones in poor condition associated with lack of maintenance and siltation. The total capacity is about 200 km³, but this includes 188km³ stored in three large hydropower dams - Kariba on the Zambezi River, which is shared between Zambia and Zimbabwe and which accounts for 94 km³ of this capacity, and Itezhi Tezi and Kafue Gorge dams on the Kafue River.

Zambia has an installed hydropower capacity of 1 670 MW. The present capacity of the Kafue Gorge dam (currently under rehabilitation) on the Kafue river is 900 MW, while the Lake Kariba dam contributes about 600 MW and the Victoria Falls 108 MW. The hydropower stations Lunsefwa North-Eastern and Kabompo Lunsefwa hydropower have capacities of 24 MW and 38 MW respectively. Currently, the government of Zambia is making progress in the preparatory works for the construction of Itezhi-tezhi and Kafue Gorge II hydropower projects. It is also exploring the construction of mini-hydropower stations in potential areas of Northern, Luapula, Copperbelt and North-Western provinces where natural water falls are available.

1.2 CLIMATE CHANGE

Historically, Zambia has been affected by droughts and floods and in recent decades the frequency and severity of these climatic hazards have increased. In the last seven years of this decade Zambia has had to endure droughts in the rainy seasons of 2000/01, 2001/02 and 2004/05 while floods have occurred in 2005/06 and 2006/07. The impacts of these droughts/floods have included widespread crop failure/loss, outbreaks of human and animal diseases, dislocation of human populations and destruction of property and infrastructure.

The Ministry of tourism, environment and natural resources (2007) forecasts an increase in the mean temperature for all the regions in Zambia: in the period 2010 to 2070 mean temperatures will rise of about 2 °C (24.5 to 26 °C). Moreover, for precipitation, all the regions will be affected by an increase in the average rainfall in comparison with the baseline considered (1970-2000).

2. NATIONAL STRATEGIES FOR WATER, AGRICULTURE AND ENERGY

2.1 POLICY CONTEXT

The Government of the Republic of Zambia has since the early eighties realigned agricultural policy to achieve market liberalization, as part of the **Structural Adjustment Programme** (SAP). The SAP included an economic and social policy package with an emphasis on the revitalization of the economy through productive sectors such as manufacturing and agriculture, placed as one of the key priority sectors for economic growth and development and poverty reduction.

The vision for Government as is thus to develop an efficient and competitive agricultural sector that assures food security at both household and national levels and also maximizes the contribution of the

sector to GDP. To realize this vision, Government has in the past three years prepared several documents to guide development in the sector: These documents are: **National Agricultural Policy (NAP)**, formulated to pursue national and household food security, increase agricultural exports, generate income and employment through increased agriculture production and productivity; **Poverty Reduction Strategy Paper (PRSP)**; **Agricultural Commercialization Programme (ACP)**, formulated as the agricultural component of the PRSP to guide the sector's vision as set out in the NAP with the overall goal to achieve sustainable and broad-based agricultural growth; and **Transitional National Development Plan (TNDP)**.

The **Fifth National Development Plan (FNDP)** for 2006-2011 has incorporated the National Irrigation Plan (produced as part of the National Irrigation Policy and Strategy of 2005) and proposes the development of 70 000 ha of new irrigation by the year 2010. Of this 70 000 ha, 10 000 ha will be large scale commercial, 30 000 ha emergent farmer irrigation and 30 000 ha small scale developments. Prospects for achieving the outstanding area under the FNDP are not encouraging with the high cost of borrowing money (on periods only up to three years) and problems in finding collateral proving to be major constraints for smaller scale farmers, the collapse of the Government's Irrigation Development Fund (set up to support the National Irrigation Plan in 2007 but now moved to the Citizens Economic Empowerment Commission (CEEC) without lending any money and the current power generation issues all combining to act as brakes on irrigation development where water, land and other factors (such as market proximity, access) are not already limitations to further development.

The **National Agricultural Policy (NAP)** (2002-2010) has been prepared to guide development in Zambia for the period 2002-2010. The main objectives of the policy are in line with Government's desire to alleviate poverty, ensure food security and to facilitate economic growth through the commercialisation and development of the agricultural sector. National and household food security will be achieved by the dependable annual production of basic foodstuffs on a competitive basis. The agricultural resource base will be maintained and improved upon. The main policy thrust will be the exploitation of available water resources to contribute to the successful performance of the agricultural sector. The policy emphasises the use of wells, dams and boreholes for water supply requirements and the adoption of irrigation development throughout Zambia. For successful private sector driven development the NAP recognises that land tenure issues will have to be addressed and that significant public investment in rural infrastructure (feeder roads and bridges and electricity supplies) will be required.

The overall approach will be to commercialise the agricultural sector to the greatest extent possible. To this end the Government of Zambia prepared the Agricultural Commercialisation Programme which is ongoing.

Several policies have been undertaken to tackle the threats posed on the environment and on all the economic sectors by climate change:

- **National Environmental Action Plan (NEAP)**, 1994: gives an overview of the country's environmental problems, existing legislation and institutions, and strategy options for improving environmental quality.
- **National Policy on Environment** 2007: provides environment and natural resources management policies to address current and future threats to environment and to human livelihoods and provides policy guidelines for sustainable development.
- **Zambia National Action Plan for Combating Desertification**, 2002: it aims to contribute to sustainable environmental management through the reduction/control of land degradation thereby contributing to poverty reduction, food self sufficiency, and ultimately contributing to economic growth.

Also in the energy sector the action of the Government of Zambia is guided by the **National Energy Policy** (1994) which aims to promote optimum supply and utilization of energy, especially indigenous forms, to facilitate the socio-economic development of the country and maintenance of a safe and health environment. Specific policies include: reducing dependence on wood fuel; increasing accessibility and development of the most cost effective hydro-electricity power sites; improve efficiency in the importation and consumption of petroleum; promote the role of coal in meeting

energy demands while minimizing the environmental impacts of coal mining and utilization; and, overcome the constraints preventing wider use of new and renewable sources of energy.

2.2 INVESTMENT ENVELOPE

The investment envelope for the short, medium and long term is presented in the Table below and expressed in million US \$ (based on CAADP investment projections).

Time scale	Type of investment (million US\$)			Total
	Small scale water control	Rehabilitation of irrigation	Large scale hydraulic projects	
Short-term	144	5	5	153
Medium-term	91	11	27	130
Long-term	45	2	56	104
Total	281	18	88	387

2.3 PROJECT PORTFOLIO

Section 3 presents recently achieved, active and pipeline projects related to the above investment envelope. Currently, there are six project profiles already prepared with a large water component that range from US\$1.2 million for a climate change adaptation project directed towards land use practices to US\$37.5 million for the Mid-Zambezi Project. Amongst these projects, there is a Bankable Investment Project Profile for approximately US\$11 million with a large water component. Finally, four recent and ongoing projects can be identified, ranging from about US\$11 million to about US\$57 million.

3. PROJECT PROFILES (ON-GOING AND PROJECTED)

Project title	Funding Partners	Time Scale	Total Budget	Description
I. PROJECTS RECENTLY IMPLEMENTED				
Agricultural Sector Investment Project	World Bank	1995-2005	US\$60 million (Total project cost includes funding from World Bank and non-bank sources)	The project has four main components: policy and institutional improvements, public investment, private sector development, and pilot investment schemes, which will establish a rural investment fund to support small-scale capital investments in rural communities.
Power Rehabilitation Project	World Bank	1998-2005	US\$ 198.4 million (Total project cost includes funding from World Bank and non-bank sources)	The project includes 1) rehabilitating hydropower stations and distribution and transmission systems 2) implementing a rehabilitation and development program for the Gwembe-Tonga, a group unsuccessfully resettled during Kariba Dam construction; 3) improving the efficiency of ZESCO.
Smallholder Irrigation and Water Use Programme	IFAD, IDA, Government, Beneficiaries	1996-2002	US\$ 11.2 million	The programme's objectives included: (i) reinforcing informal irrigation systems; (ii) transferring ownership and management of government irrigation systems to farmers; (iii) organizing small-scale farmers into water users' associations; (iv) strengthening local institutions
Southern Province Household Food Security Programme	IFAD, UNDP, Government, Beneficiaries	1995-2002	US\$ 23.4 million	Project activities included: (i) ensuring agricultural extension services; (ii) ensuring that research and technical assistance supported extension services according to farmers' needs; (iii) providing animal production and health care services; (iv) distributing drought-resistant seed varieties for traditional crops; (v) providing on-farm storage facilities; (vi) creating a fund to support community initiatives such as building of earth dams, cattle dips and irrigation works; (vii) improving access roads; (viii) providing safe water supplies
II. ON-GOING PROJECTS				
Small Scale Irrigation Project	AfDB/ ADF; Gov. Of Finland	2002-2009	US\$11.0 million; US\$ 10.9m	1,900ha on 6 small scale schemes + support services. Project ending 2008.2009
Water Sector Performance Improvement Project	World Bank	2006-2012	US\$23 million (Total project cost includes funding from World Bank and non-bank sources)	The project aims to support the government's on-going commitment to urban and rural water sector reforms by improving access to and sustainability of water and sanitation services for consumers in Lusaka.
Agricultural Development Support Project	World Bank	2007-2012	US\$30.0 million	Small irrigation component (80ha cotton seed farm project) Cotton Development Trust
Kafue Gorge	ZESCO	End: 2008	US\$ 50 million	Hydropower Project on the Zambezi River. Up rating from 6 x 150 MW to 6 x 165 MW. 2 units uprated to 2 x 165 MW. 2 units being uprated to 2x165 MW. Last 2 units to be uprated by Dec 2008.

Kariba North Bank	ZESCO	End: 2009	US\$ 60 million	Upgrading from 4 x150 MW to 4 x 180 MW. 2 units have been upgraded to 2 x 180 MW, one unit being upgraded. Last unit to be upgraded mid 2009.
Power Rehabilitation Project	World Bank European Investment Bank, DBSA, NORAD, Gov. Of Finland, CFD, AfDB, Government & ZESCO	1998-2005 (2009)	About US\$ 273m of the estimated project cost of US\$ 317m at completion has been disbursed and about US\$44 m is required to complete the remaining works	The project includes 1) rehabilitating hydropower stations and distribution and transmission systems 2) implementing a rehabilitation and development program for the Gwembe-Tonga, a group unsuccessfully resettled during Kariba Dam construction; 3) improving the efficiency of ZESCO. The remaining works are scheduled to be completed by January 2009 at Kafue Gorge and September 2009 at Kariba North bank Power Station.
III. PIPELINE PROJECTS				
Bankable Investment Project Profile (BIPP): Nega-Nega Irrigation Scheme Development	FAO-NEPAD		US\$11,184,825; US\$ 39,000 pre feasibility	Pre feasibility studies undertaken for Lubu, Nyamphande and Lusitu. Report under consideration It is a demand driven project and brainchild of the commercial and small-scale farming community of Nega-Nega, Magobbo, Lubombo, Kabesha and Makuku farming area in Mazabuka district. The government has given top priority to the development of this irrigation scheme.
Irrigation Development Support Project (previously the Commercial Agricultural Development Project)	World Bank	2010-2016	US\$ 53m	Commercial irrigation project - large and small scale. Awaiting feasibility studies.
Mid Zambezi Project (Zambia, Zimbabwe and Botswana)	AfDB + others	2008-2015	US\$57.0 million (Z)	1,550ha small scale irrigation + roads. Project not started yet. Zambia opted for National programme
Adaptation of the Effects of Drought in the context of Climate Change in Agro-Ecological Region I of Zambia	MACO		US\$3,000,000	The overall objective is to reduce the vulnerability of those depending on rainfed agriculture practices to anticipated rainfall shortages in the face of climate change including variability. It will focus on the introduction of irrigation and water management systems, training, capacity building of farmers on water management practices, support to marketing, provision of credit.
Adaptation of land use practices (crops, fish, and livestock) in light of climate change	MACO, ZNFU		US\$1,200,000	The objectives of the project are to enhance improved food security, income generation and business opportunities in all agricultural sectors; and to identify species best suitable for aquaculture under changing climatic conditions due to global warming
Kariba North Bank Extension	ZESCO /Private Partner	End: 2012	US\$ 312 million	2x180 MW hydro extension. Dam already exists. Financing negotiations being done in conjunction with Kafue Gorge Lower but priority is being given to the implementation of Kariba North Extension. Detailed engineering design needs to be done.
Itezhi-Tezhi	ZESCO /Private Partner	End: 2011	US\$270m million	Hydropower project on the Zambezi river. Capacity: 120 MW. Project targeting local and export market. Main technical issues agreed. Agreement signed with TATA Africa on implementation of the project. Preparatory works already commenced. Cost of Power Station \$190m and \$80m is cost of transmission
Kafue Gorge Lower	ZESCO /Private Partner	End: 2015	US\$ 1.5 billion	Earth rock fill type dam proposed upstream of existing station. Capacity: 750 MW. Project targeting local and export market. Discussions underway with potential investors. Reservoir operation studies done to select dam site location. Project now overseen by the Ministry of Energy and Water Development of Zambia
Kabompo	ZESCO /Private Partner	End: 2012		Hydropower project on the Zambezi River. Capacity: 34 MW. Private.
Kalungwishi	IPP	End: 2013		New hydro power development (210 MW). Feasibility study to be done.

Batoka (Regional Projects: Zimbabwe and Zambia)	(SAPP)	2013 - 2018	US\$ 1250 million	Project entails the construction of a run off the river hydro power plant on the Zambezi River, 54km down stream of the Victoria Falls. Project lead-time is 6 years. 4 x 200 MW units on either side of the dam (Total 1600 MW) with capacity shared equally between Zimbabwe and Zambia. To target regional market. Zambezi River Authority is coordinating the dam part of the project. Feasibility Studies completed. Agreement between Zimbabwe and Zambia needed to proceed with the project. Project lead-time is 5 years from financial closure.
Mombututa	(SAPP)	End: 2018		Hydropower project on the Zambezi River. Capacity: 900 MW.

ANNEX 1: MAP OF WATER CONTROL IN ZAMBIA:



ANNEX 2: COUNTRY STATISTICS

Country and population								
Area of the country	2005	75261	1000 ha					
Cultivated area as % of the total area of the country	2005	7.0	%					
Total population	2005	11668	1000 inhab					
• of which rural	2005	63	%					
Population economically active in agriculture	2005	3293	1000 inhab					
• as % of total economically active population	2005	66	%					
• female	2005	65	%					
• male	2005	53	%					
Economy and Development								
Gross Domestic Product (GDP) (current US\$)	2007	11363	million US\$/yr					
• value added in agriculture (% of GDP)	2006	21.82	%					
• GDP per capita	2007	953	US\$/yr					
Access to improved drinking water sources								
Total population	2006	58	%					
Urban population	2006	90	%					
Rural population	2006	41	%					
Water Resources and management								
Average precipitation	2007	767.4	10 ⁹ m ³ /yr					
Total actual renewable water resources	2007	105.2	10 ⁹ m ³ /yr					
Dependency ratio (transboundary rivers)	2007	23.8	%					
Total actual renewable water resources per inhabitant	2007	9016	m ³ /yr					
Total dam capacity	2002	106	10 ⁹ m ³					
Total water withdrawal	2000	1.74	10 ⁹ m ³ /yr					
• as % of total actual renewable water resources	2000	1.65	%					
IRRIGATION AND DRAINAGE								
Irrigation potential	2007	523	1000 ha					
Water Management								
Area equipped for irrigation: full control - total	2002	55.387	1000 ha					
Equipped lowlands	2002	100.525	1000 ha					
Total area equipped for irrigation	2002	155.912	1000 ha					
• Area equipped for irrigation as % of cultivated area	2002	2.9	%					
• Annual increase rate		12.9	%					
• Power irrigated area as % of area equipped for irrigation	2002	24.8	%					
• Area actually irrigated as % of area equipped for irrigation	2002	100	%					
Non-equipped cultivated lowlands and flood recession	2002	100	1000 ha					
Total agricultural water managed area	2002	255.922	1000 ha					
• Agricultural water managed area: as % of cultivated area	2002	4.8	%					
• Drained cultivated area as % of total cultivated area			%					
Typology of irrigation schemes								
Small-scale schemes (<ha)	2002	11.00	1000 ha					
Medium-scale schemes (- ha)	2002	7.372	1000 ha					
Large-scale schemes (>ha)	2002	37.015	1000 ha					
Irrigated crops								
Wheat	2002	12.2	1000 ha					
Rice	2002	8	1000 ha					
Maize	2002	1.5	1000 ha					
Sugar cane	2002	18.418	1000 ha					
Vegetables	2002	3	1000 ha					
Bananas	2002	3	1000 ha					
Citrus	2002	2.21	1000 ha					
Coffee	2002	5.16	1000 ha					
Tea	2002	0.52	1000 ha					
Cotton	2002	0.035	1000 ha					
Other annual crops	2002	1.344	1000 ha					
ENERGY INDICATORS								
Energy Production	2005	6.51	Mtoe					
Net Imports	2005	0.67	Mtoe					
TPES	2005	7.12	Mtoe					
- TPES/Pop	2005	0.61	toe/capita					
- TPES/GDP	2005	1.76	toe/thousand 2000 US\$					
- TPES/GDO (PPP)	2005	0.67	toe/thousand 2000 US\$ PPP					
Electricity Consumption	2005	8.28	TWh					
- EC/Pop	2005	709	kWh/capita					
ENERGY SUPPLY AND CONSUMPTION (2005)*								
	Coal	Gas	Crude oil	Petroleum products	Hydro	Other Renewable & Waste	Others	TOTAL
Production	144	0	0	0	764	5605	0	6513
Imports	0	0	594	115	0	0	0	709
Exports	-7	0	0	-9	0	0	-21	-37
International Marine Bunkers	0	0	0	0	0	0	0	0
Stock Changes	-42	0	0	-18	0	0	0	-60

Total Primary Energy Supply (TPFS)	95	0	594	88	764	5605	-21	7125
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* in thousand tonnes of oil equivalent (ktoe) on a net calorific value basis.

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