Confidential Item

CAMPBELLTOWN CITY COUNCIL

150 YEARS 1868-2018

Confidential Item

For Council meeting to be held on

Tuesday 1 May 2018 at 7.30 pm

Refer Item 11.1

LED Street Lighting Bulk Replacement Program

Briefing Paper

Prepared for
City of Campbelltown City Council

Version	Author/Reviewer	Date	Description of changes
V0a	James Tait	7/2/2018	First internal draft
V0b	Sean Lithgow	16/3/18	Initial review
V1a	Alexi Lynch	20/3/18	Review and draft ready for Council for feedback
V1b	Alexi Lynch	5/4/2018	Update with Council feedback/input
V1c	Alexi Lynch	9/4/2018	Briefing Paper version

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About Ironbark Sustainability

Ironbark Sustainability is a specialist consultancy that works with government and business around Australia by assisting them to reduce energy and water usage through sustainable asset and data management and on-the-ground implementation.

Ironbark has been operating since 2005 and brings together a wealth of technical and financial analysis, maintenance and implementation experience in the areas of building energy and water efficiency, public lighting and data management. We pride ourselves on supporting our clients to achieve real action regarding the sustainable management of their operations.

Our Mission

The Ironbark mission is to achieve real action on sustainability for councils and their communities.

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1. Glossary

Term	Definition
AER	Australian Energy Regulator. Responsible for regulating pricing for electricity in the National Electricity Market (exc. WA and NT), including street lighting
AS/NZS 1158	Australian and New Zealand standards for lighting for roads and public spaces.
Category P	Pedestrian Category Roads
Category V	Vehicle Category Roads
CEFC	Clean Energy Finance Corporation (formally Low Carbon Australia)
CLER	Customer Lighting Equipment Rate (tariff)
COAG	Council Of Australian Governments
Colour temperature	The measurement of light colour expressed in Kelvin (°K). The lower the Kelvin rating the "warmer" or more yellow the light is. The higher the Kelvin rating the "cooler" or more blue the light is.
Control gear	An internal component of a street light that ignites the lamp and/or provides a regular flow of electric current to the lamp
CRI	Colour Rendering Index
DNSP	Distribution Network Service Provider, also known as Energy Distribution Business (EDB) also known as distributors.
EDPR	Electricity Distribution Price Review
ERF	Emissions Reduction Fund
GHG	Greenhouse Gas
HPS	High Pressure Sodium lamp
Lamp	The light bulb in a luminaire
LED	Light emitting diode
LGA SA	Local Government Association South Australia
Luminaire	The lamp, fitting and control gear of the light
MH	Metal Halide
MV	Mercury Vapour lamp
PE Cell	Photoelectric Cell. Common switching mechanism for street lighting that turns lights on at dusk when ambient light levels drop below a set point. Vice-versa for dawn.
PLC	Public Lighting Customer Funded (tariff)
SA	South Australia
SAPN	SA Power Networks
SLUoS	Street Lighting Use of System (tariff)
Spacing	Spacing refers to the distance between two road lights
Street Lighting	Street lighting found in residential streets and main roads
TFI	Transferred Infrastructure (tariff)
UV	Ultraviolet (light)
WDV	Written Down Value, also known as Residual Value

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2. Summary

Campbelltown City Council has a unique opportunity to be one of the first councils in South Australia to change all residential street lights to LED. In doing so, this would represent the single greatest electricity reduction project in Council's history and save roughly $9 million over the life of the new LED lights[1]. Given significant recent electricity price rises from January 2017 and more uncertainty in 2018 onwards, the impetus to reduce energy use is clear and cost savings would be immediate.

Council has around 5,000 street lights. Around 4,300 (86%) of Council's lights are fully funded by Council (i.e. Council pays all energy and maintenance charges). The remaining 14% of street lights are cost-shared with the Department of Planning, Transport and Infrastructure (DPTI), with the Department responsible for 50% of costs.

Close to 100 of Council's lights are already LED lights or do not have SAPN-approved LED replacements currently available, and are not considered here. Of the lights considered for replacement with LED, around 98% (4,103) are SLUoS lights, meaning that Council pays a service charge to SAPN to maintain the light and pole over its life as well as replace the luminaire upon failure. The remaining 79 lights are owned by Council and incur a CLER tariff from SAPN. This tariff covers warranty management and basic maintenance of the luminaire (for example cleaning), however Council is responsible for maintenance of the supporting infrastructure (for example poles and brackets) and the replacement costs.

We have modelled various scenarios (for example, changing over all lights; changing just P-category lights; excluding "cost-shared" lights and more). or each scenario, we have modelled the outcomes under "Realistic", "Pessimistic" and "Optimistic" conditions, with the outcomes of the realistic model presented in the report and the remaining models available in a more detailed Technical Reference Paper. Model assumptions are also available in the Technical Reference Paper.

2.1 Benefits

The new LED streetlights to be installed will reduce energy usage dramatically. For example, the existing 80 Watt Mercury Vapour streetlights which make up around 40% of Council's P-Category street light stock use 82% more energy than the replacement 14W LED. Put another way, the incumbent 80W mercury vapour street lights use 5.6 times the electricity of LED alternatives[2].

In addition to offering lower costs, energy consumption and greenhouse emissions, the new lights provide better lighting outcomes for the community, including:

- Greater uniformity of light across and along the street,

[1] Figures quoted are from the "average model" with a one-year implementation period, considering Council's SLUOS lights only. See assumptions in the Technical Reference Paper for more information on the difference between "average", "pessimistic" and "optimistic" scenarios.
[2] Based on the total wattage of each light, as opposed to the nominal lamp rating. For example, an 80W MV has a total wattage of 95.8 Watts and the 14W LED a total wattage of 17 Watts.

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- Better colour rendering and visibility,
- Less depreciation of the light output over time, and
- Lower glare.

Council has indicated that only LED technology should be considered in this business case (as opposed to, for example, fluorescent technology) and that all existing street lights (Mercury Vapour, Fluorescent, High and Low Pressure Sodium) should be considered for replacement.

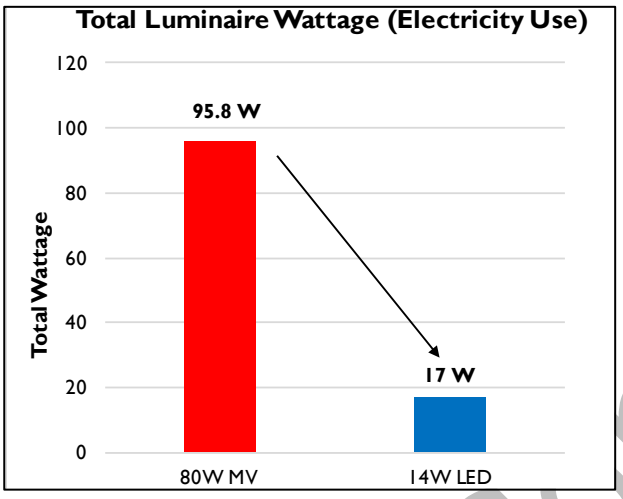


Figure 1: Comparison of 80W MV and 14W LED Electricity Use

The analysis undertaken by Ironbark demonstrates that there is a good business case for an LED street lighting changeover for lights that are fully funded by Council (i.e. not cost-shared with DPTI). For cost-shared lights, the business case is less attractive and we recommend focusing on Council-funded lights initially.

The transition to the new "PLC LED tariff" offers the best value to Council from a financial point of view. The project will have a positive Net Present Value under a range of scenarios and has an estimated payback period for Council-funded SLUoS lights of 4.2 years under an "average" economic forecast model with transition to a PLC tariff and a one-year implementation period. The payback period for the transition to TFI is 5.0 years, while the payback period for CLER lights is 6.4 years. Note that transitioning to SAPN lights incurs no upfront costs to Council, but the net simple savings over the project's lifetime are around $2.4 million less than for the PLC tariff.

Transitioning to LEDs under the PLC model over one year is expected to cost approximately $1.8 million. Net lifetime cost savings are projected to be $9 million[3] and the lifetime greenhouse savings are over 9.7 kt CO2 -e. Project cost savings are reduced if the TFI or SAPN LED option is selected. Transitioning Council's fully funded CLER lights to LEDs would cost a further $42,000, and yield $113,000 in savings and an additional 134 tonnes of greenhouse gas reduction.

[3] Depending on preferred tariff, based on "average" economic forecasts and a 1-year implementation period. These figures are based on changing "full cost" council lights, excluding cost-shared lights.

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This project is complimentary to the broader street lighting negotiations currently taking place, such as the attempt by the Local Government Association of South Australia (LGA) to provide alternative ownership and maintenance arrangements for street lighting. In 2016, the LGA provided a business case stating that through a council-owned or operated model, councils could save additional costs, as opposed to signing individual agreements with SA Power Networks (SAPN).

In April 2018, the LGA announced that it had decided not to go ahead with the alternative ownership model and "not to proceed with the establishment of a public lighting company as the risk to the Association was considered to be too great". This does not prevent the investigation into other similar alternative ownership models into the future, noting that at the moment the approach put forward by the LGA cannot currently be implemented, as there are significant impasses that would need to be resolved either by negotiation with SAPN or political intervention by the state government[4]. However, Council can essentially hedge its bets by changing to LEDs in the immediate-to-short term, and reaping the immediate energy and maintenance savings. Then if there is a successful negotiation around alternative ownership between SAPN and another party in the future (be that Council, the LGA or a third party) then Council can transition to that new model if it makes financial sense to do so.

Ironbark recommends that Council:

- Seek internal funding or external financing to change all residential (P category) street lights to LED under the PLC tariff arrangement.
- Negotiate with DPTI regarding arrangements to changeover cost-shared lights subject to DPTI paying their contribution.
- Open new lines of communication with SAPN with an aim to come up with a quick resolution of issues around alternative ownership models and improved maintenance regimes and services. This has been proposed as a part of the wider engagement between Council, Unley City Council and Ironbark Sustainability.

2.2 Summary of Cost Savings

Table 1 summarises the analysis from changing all full-cost lights to LEDs using a one-year implementation period (scenario 4). The PLC arrangement offers the highest savings to Council. Note that this assumes that Council is funding the project internally, there are no borrowing costs.

Table 1: Change all lights fully funded by Council, one-year implementation period

Statistic	CLER	SLUoS > PLC	SLUoS > TFI	SLUoS > SAPN
Number of lights changed	79	4,103	4,103	4,103
Average maintenance tariff per light per year (current charges)	$37	$64	$64	$64
Average LED maintenance tariff per light per year once lights are changed	$19	$46	$61	$85

[4] The detailed Technical Reference Paper provides detailed comment on the potential benefits and risks of an alternative model and the LGA business case presented to councils in late 2016.

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Cumulative Greenhouse Savings from commencement (t CO2 –e)	134	9,667	9,667	9,667
Average Greenhouse savings pa (t CO2 –e)	7	483	483	483
Pessimistic				
Changeover costs (simple)	-$49,078	-$2,128,298	-$2,128,298	$0
Overall net simple savings (savings less costs)	$63,914	$5,437,246	$4,331,744	$3,363,938
Net Present Value of savings	$29,272	$3,074,010	$2,300,928	$2,379,635
Payback period	8.4	5.4	6.3	0.0
Average				
Changeover costs (simple)	-$41,958	-$1,817,075	-$1,817,075	$0
Overall net simple savings (savings less costs)	$113,220	$8,781,640	$7,263,832	$6,311,259
Net Present Value of savings	$59,300	$5,032,047	$4,016,433	$3,979,923
Payback period	6.4	4.2	5.0	0.0
Optimistic				
Changeover costs (simple)	-$32,747	-$1,367,760	-$1,367,760	$0
Overall net simple savings (savings less costs)	$135,265	$10,400,342	$8,857,814	$7,742,878
Net Present Value of savings	$76,446	$6,202,392	$5,178,523	$4,873,660
Payback period	4.8	3.0	3.6	0.0

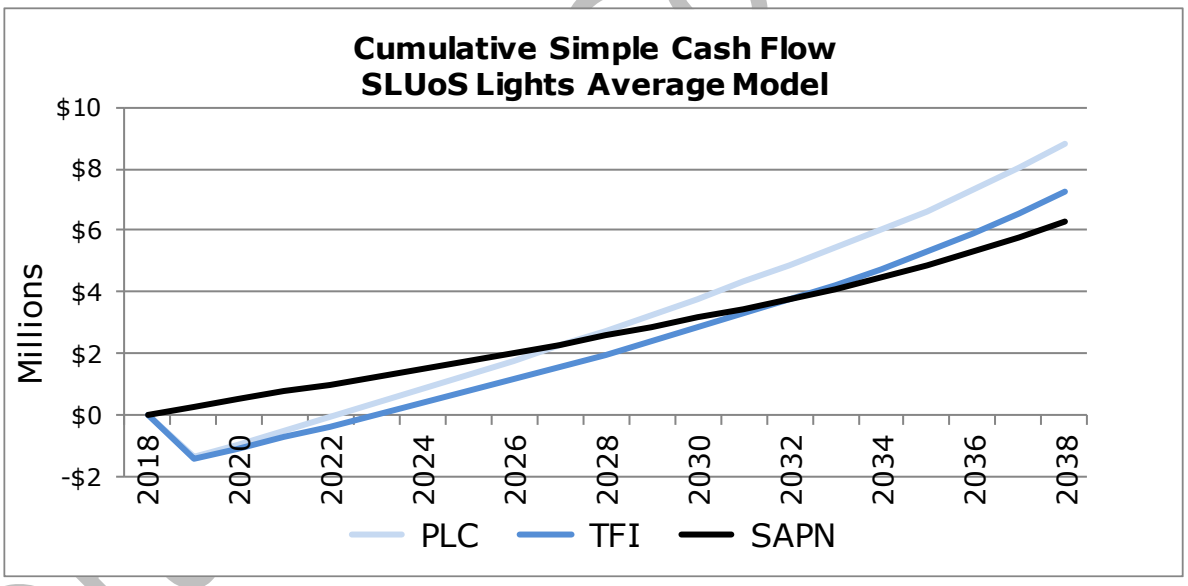


Figure 2: Change all SLUoS lights fully funded by Council, average model, one-year implementation period

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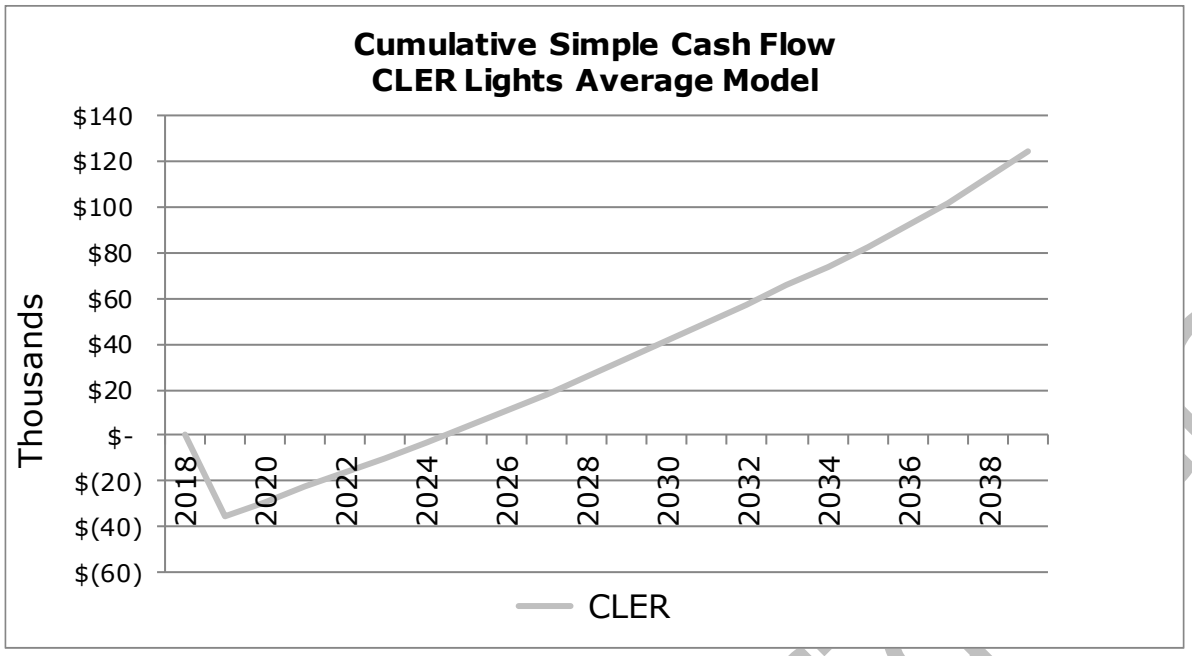


Figure 3: Change all CLER lights fully funded by Council, average model, one-year implementation period

2.3 Summary Year 1 Savings

The table below illustrates the savings that would be made in the first year alone of a changeover to LEDs via the PLC tariff.

Table 2: Change all full cost lights, first year cost comparison

July 1st 2019	Electricity Costs	Maintenance Costs	Total Costs
Business as usual (SLUoS)	$505,518	$267,879	$773,397
Change to LED (PLC)	$144,431	$191,018	$335,449
Savings (year 1)	**$361,088**	**$76,861**	**$437,949**

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3. Recommendations and Next Steps

3.1 Recommendations

The analysis undertaken by Ironbark demonstrates that there is clear financial business case for an LED street lighting changeover for P-Category lights that are not cost-shared with DPTI. The project will have a positive Net Present Value under a range of scenarios and have a payback period of 4.2 years for SLUoS lights and 6.4 years for CLER lights, under "average" economic forecast models using a one-year implementation period. The transition to the new "PLC LED tariff" offers the best value to Council from a financial point of view.

Ironbark recommends that Council:

- Seek internal funding or external financing to change all residential (P category) street lights to LED under the PLC tariff arrangement.
- Negotiate with DPTI regarding arrangements to changeover cost-shared lights subject to DPTI paying their contribution.
- Open new lines of communication with SAPN with an aim to come up with a quick resolution of issues around alternative ownership models and improved maintenance regimes and services. This has been proposed as a part of the wider engagement between Council, Unley City Council and Ironbark Sustainability.

Transitioning Council-funded P-Category SLUoS lights to LEDs under the PLC model using a one-year implementation period is expected to cost $1.8m upfront. Net lifetime cost savings (after project costs are removed but not accounting for any interest paid on loans) are projected to be $9 million[5] and the lifetime greenhouse savings are 9.7 kt CO2 -e. Transitioning Council's fully funded CLER lights to LEDs would cost a further $42,000, and yield $113,000 in savings and an additional 134 tonnes of greenhouse gas reduction.

3.2 Next Steps

Based on the information provided within this preliminary business case and Ironbark's experience with bulk changes throughout Australia, the following steps are recommended to progress the bulk change further:

1. **Prepare financial analysis (completed)**
    a. Develop clear business case;
    b. Present business case to Council to gauge interest in the program. This can also be the right time to check timeframes for the roll out;
2. **Prepare Council Report**

[5] Depending on preferred tariff, based on "average" economic forecasts and a 1-year implementation period.

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a. Work with other councils (for example Unley) for economies of scale benefits

3. **Define Council's requirements for the program**

   a. Develop Lighting Design Plan to drive the bulk change;

   b. Consult around the requirements for the new lights (in particular around safety and the treatment of public transport);

   c. Assess current lighting treatment within this context and compile and final design and specification for Council's required replacement program;

4. **Procure**

   a. Consider options for procurement including tendering or direct engagement with SAPN;

   b. Procure based on this consideration;

5. **Manage the bulk change**

   a. Ensure clear communication during the bulk change program occurs including consideration of media, complaints, timelines, variations, invoicing and incident provisions;

   b. Post-project follow-up.

At several stages, external consultancy support may be required. These costs are largely dependent on the amount of internal time and expertise able to be allocated to the project, the number of lights being replaced and the specific distribution business area involved. These costs are included in this business case.

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24 April 2018

Mr Paul Di Iulio
Campbelltown City Council
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Dear Paul,

Review of LED Street Lighting Bulk Replacement Briefing Paper

We refer to your instructions to review the LED Street Lighting Bulk Replacement Briefing Paper (Briefing Paper) prepared by Ironbark Sustainability (Ironbark) dated April 2018. The Briefing Paper presents the Campbelltown City Council (Campbelltown) with a cost benefit analysis relating to the opportunity to replace most existing street lights in the City with a combination of 14W, 105W and 198W LEDs at an estimated capital cost of $1.859 million.

The Briefing Paper recommends that Campbelltown:

- seek internal funding or external financing to change all residential (P category) street lights to LED under the PLC tariff arrangement;
- negotiate with the Department of Planning Transport and Infrastructure (DPTI) regarding arrangements to changeover cost-shared lights subject to DPTI paying their contribution; and
- open new lines of communication with SAPN with an aim to come up with a quick resolution of issues around alternative ownership models and improved maintenance regimes and services. This has been proposed as a part of the wider engagement between Campbelltown, Unley City Council and Ironbark Sustainability.

The recommendations are based on financial analysis undertaken by Ironbark that assumes a 4.2 year payback period on the purchase and installation of 4,103 LEDs under the 'PLC Tariff' arrangement and a 6.4 year payback period on the purchase and installation of 79 LEDs under the 'CLER Tariff'. The financial analysis assumes annual savings based on Table One extracted from the Briefing Paper.

Table One: Identified cost savings from LED implementation

July 1st 2019	Electricity Costs	Maintenance Costs	Total Costs
Business as usual (SLUoS)	$505,518	$267,879	$773,397
Change to LED (PLC)	$144,431	$191,018	$335,449
Savings (year 1)	**$361,088**	**$76,861**	**$437,949**

As electricity usage for street lights is not metered, these electricity costs are based on existing tariff structures with SAPN and are 'known in advance and guaranteed'. Maintenance costs are also based on current pricing supported by existing Agreements with SAPN. Therefore the identified annual savings, and the underlying basis for the Business Case appears to be robust.

The Briefing Paper concludes, that the PLC Tariff option is the preferred option 'as it offers the best value to Council from a financial point of view'. While it clearly has

the best financial outcome based on the analysis, we are not certain whether a risk weighting has been applied in reaching this conclusion.

The Briefing Paper does not identify financial and operational risks relating to the broader Project nor does it identify the specific risks relating to each identified Tariff arrangement. We consider this a gap in the analysis.

Under the PLC Tariff, Campbelltown funds the purchase of and is responsible for the end of life replacement of the LEDs. This means that Campbelltown has ownership of a new asset class that it did not previously manage and is responsible for replacement, failure and breakage of the LEDs.

Campbelltown should consider whether it has the expertise to manage this asset class, or whether SAPN, through a TFI or SAPN Tariff is a more desirable operating model based on a risk weighted financial assessment.

Further, under the PLC Tariff, as the LEDs are owned by Campbelltown, Campbelltown is also responsible for:

- Replacement if failure or damage occurs; and
- Funding of the assets, both in terms of the cost of finance in funding the upfront capital required (interest) and funding ongoing asset renewal (depreciation).

The Briefing Paper does not identify whether the financial analysis has accounted for project scoping costs, consulting fees and potential additional insurance costs arising from the increase in value of the Campbelltown asset base from the purchase of the LEDs. If these items, particularly depreciation and financial costs, have not already been included in the financial assessment, the actual payback period is likely to be longer than the current analysis suggests.

Accordingly, it is recommended that Campbelltown should:

- ensure that Ironbark includes a cost of finance and to the extent that it hasn't been done already, incorporates the whole of life asset management costs (including depreciation and internal asset management) in the financial analysis;
- undertake a risk assessment on the broader Project and a more detailed risk assessment on the three Tariff options under consideration; and
- review the merits of the PLC versus TFI or SAPN tariff on a risk weighted assessment basis.

Should you have any questions about this advice, please do not hesitate to contact Mark Booth or myself.

Yours faithfully
BRM HOLDICH

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