March 2017

DSM Spotlight

The Newsletter of the International Energy Agency Demand-Side Management Programme

ieadsm energy efficiency

Task 24 *Creating "Magic" with Non-State Actors*

IEA DSM Task 24, called "Behaviour Change in DSM – Helping the Behaviour Changers", has always been known to be a little unusual and not afraid to trial new things – like widely utilising social media and creative tools, for instance cartooning workshops or making presenters use Pecha Kuchas (20 slides and 20 seconds per slide is all you get!) to focus them on the main points they are making. The Task is also well known for its big focus on storytelling, which culminated in its Operating Agent, Dr. Sea Rotmann, being asked to co-edit a Special Issue on "Storytelling in Energy and Climate Change Research" in the journal, Energy Research and Social Sciences (ERSS). However, the Task usually follows the IEA convention of engaging National Experts in financially participating countries to work on specific issues as outlined in the work programme.

This changed though when Subtask 11 – Real-life Pilots was trialled successfully for the first time last October with the second largest hospital network in North America, the Carolinas Health Services (CHS). This voluntary Subtask allows non-state actors who are interested in utilising some of the tools created in the Task 24 Subtask 8 toolbox to finance a specific case-study intervention on a specific behaviour change issue they need help with. These non-state actors do not have access to all the information that National Experts from participating countries do, nor do they support the development and dissemination of Task 24 tools – except as related to their specific case studies. But this somewhat more flexible business model does help the IEA DSM to gather more case studies and examples where Task 24 tools have successfully been used to design, implement and evaluate behavioural interventions,

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Note from the Chairman

As the world changes from writing and reading to tweeting, we too can adapt…

Rob Kool
IEA DSM Chairman

IEA-DSM @IEADSM

Statistics prove #renewables & #energyefficiency create jobs and make this world great!

Member Countries

Austria | Belgium | Finland | India
Italy | Netherlands | New Zealand | Norway | South Korea
Spain | Sweden | Switzerland | United Kingdom | United States

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Behaviour Change – from page 1

usually as pilot projects that take around 12 months to deliver.

In the case of CHS, the Task was invited by the hospital's Sustainability Director, Kady Cowan, who was earlier considered to be the Task's National Expert from Canada. Two workshops have been held to date (in October 2016 and February 2017) as well as an international expert meeting following our second Task 24 workshop in February. The first workshop followed the usual agenda of Task 24 workshops: after introductions and background information on the Task and the wider issues to be addressed, participants delved into an issues analysis and ranked which End User (in this case, hospital building operators) and which behavioural issue (getting them to re-set set-points in the Building Automation System (BAS) after changing them following, for example, patient complaints about room temperatures) were going to be explored in more depth. Then we used our 'magic carpet' – our Behaviour Changer Framework to visualise the current energy system in relation to this specific behavioural issue and started collecting some multiple- or co-benefits of this intervention and metrics of how to measure it, and who would measure it. Finally, the day finished with a fun storytelling exercise where each Behaviour Changers (representing the Decision-makers, Experts, Providers, Conscience and Middle Actors) got to tell the story of how the intervention would pan out from each of their unique perspectives.

The second workshop delved into choosing a pilot scenario and starting on the design of several interventions to meet the major goals of the pilot. This was followed by a 2-day session with an international expert panel where the evaluation scheme for the interventions decided during the Task 24 workshop was developed. This intense 3-day exercise was hugely successful to the point where one Canadian hospital expert, David Bligh from Efficiency One in Nova Scotia exclaimed, *"We have managed to design an intervention pilot in 3 days... This would normally take a professional working for a solid month full-time!"* There is still some detailed design work to be undertaken by Kady Cowan's Energy Connect team at CHS, but the bulk of the pilot, from its major goals to the five interventions, and many metrics of how to assess successful outcomes for each Behaviour Changer involved in rolling out the pilot is finished. It was a true testimony to the strength of using a Collective Impact Approach, which focuses on facilitating multi-stakeholder engagement in a participatory, co-creative research setting. Even more importantly, every single participant, from the hospital's energy and facility team to the international experts and the building operator representative (the End User) agreed that this process led to a feeling of 'magic' being created in the room.

As difficult as it is to measure or describe the 'magic' that such a collective, collaborative, co-creative process can foster, as important it is when helping to convince the relevant Behaviour Changers that participate in it that an intervention will indeed be successful. Everyone in the room felt that they had provided an important piece of the puzzle to help shape the intervention. Buy-in from all relevant actors – an all-important feature for any successful rollout – is thus ensured. Most importantly, everyone also agreed that the process was highly engaging and fun. We hope to find more non-state actors and sectors with behaviour change issues that are willing to join us in "creating magic".

For more information, please contact Task 24 Operating Agent Dr. Sea Rotmann at drsea@orcon.net.nz

Behaviour Changers from Carolina Health Services (CHS) busy "creating magic" when deciding on which scenarios would be most useful for behavioural interventions involving the Building Operators.

Behaviour Changers from University Health Network (UHN) Toronto after a completed 'magic carpet' exercise. Several of them were also part of the international expert group designing the evaluation of the pilot at Carolina Health Services (CHS).

IEA DSM *at Work on Behaviour Change*

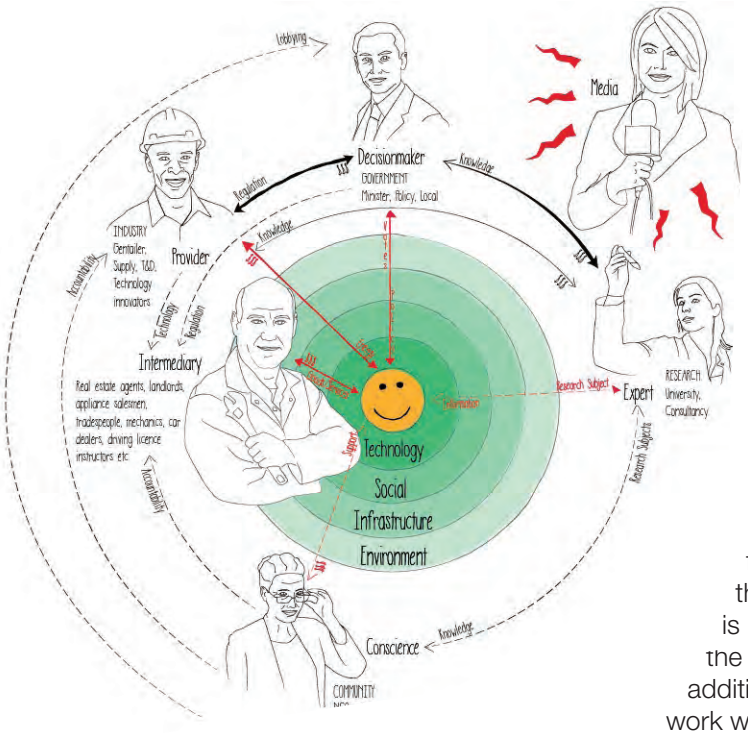
Interview with Sea Rotmann

What is Task 24: Phase II: Behaviour Change in DSM: Helping the Behaviour Changers aiming to do?

The overarching goal of Phase 1 of this Task was to provide a helicopter overview of best practice approaches to behaviour change interventions in energy efficiency. We then took the theory of Phase 1 and are now developing practical, tailored guidelines and tools for Behaviour Changers for how to best design, implement, evaluate and disseminate energy behaviour interventions in real life, in Phase 2.

Why is the Task's work important for countries, policymakers, customers?

The IEA, and other governmental organisations, realise that human aspect of energy use - how we buy, use, create, maintain and waste energy products and services - lies at the core of many of our problems. Understanding it better is also a major solution to these problems. Our Task helps visualise the energy system through the human rather than the technocratic lens. We also facilitate Behaviour Changers from sectors in government, industry, research, the third sector and middle actors, to co-create better behavioural interventions. This means co-designing and evaluating pilots in, for example, commercial office buildings in Sweden, universities in the Netherlands, hospitals in Canada and the US, and households in New Zealand and Ireland.



Of the Task results to date, which one do you think is having or will have the biggest impact and why?

The biggest impact will be shown from the successful use, in real-life field research applications and pilots, of our Behaviour Changer Framework and associated tools that take a Collective Impact Approach to behaviour change interventions. This means that, instead of having Behaviour Changers operate in silos when they design behavioural interventions, they are brought together and supported in how they can co-create better interventions from a whole-system perspective and a better understanding of end user behaviour. The use of storytelling as the overarching jargon-busting 'language' of Task 24 has been regarded as ground-breaking in the field of energy behavioural research.

Why is it important to do this work through the IEA DSM Programme?

The great thing about the IEA research contracts is that it allows us to take a global view to energy problems. There are few, if any, research funding organisations that take that global perspective. Task 24 is particularly flexible in taking advantage of the IEA's respected 'umbrella' brand in that, in addition to doing in-depth work with the countries that fund us directly, we also get in-kind support from over 300 behaviour change experts from 20+ countries. The ability to compare and contrast cultural contexts and approaches to behavioural interventions between so many different countries is unprecedented.

Dr. Sea Rotmann is the project leader (Operating Agent) for DSM Task 24 on Behaviour Change

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IEA DSM - *from page 3*

IEA DSM at Work

DSM and energy efficiency should be the first choice in all energy policy decisions designed to create more reliable and sustainable energy systems.

Because this combination…

- Reduces GHG emissions directly (energy savings) and indirectly (RES integration)
- Enables the integration of variable and distributed energy sources into reliable smart grids
- Makes energy transition affordable

Reliable

Sustainable

Affordable

We are supporting this DSM and EE vision in three key ways…

1. Policy relevance

   ➡ We provide **material** that is readily applicable for crafting and implementing policies and measures

2. Technology progress and adoption

   ➡ We provide **knowledge** about technologies and applications

3. Organisational and behavioural changes

   ➡ We provide **insight and methods** that can make this happen

A the saying goes, "the proof is in the pudding" so visit the IEA DSM website, keep reading our newsletter, join our webinars and reach out to our experts.

IEA DSM *at Work on Innovative Energy Services*

Building Deep Energy Retrofits: Using Dynamic Cash Flow Analysis and Multiple Benefits to Convince Investors

Deep energy retrofit (DER) of the existing building stock would be a meaningful strategy to reduce fossil fuel consumption and CO2 emissions, however, investment volumes required are enormous, for example, in Europe the cumulative demand for DER is estimated at close to 1,000 billion EUR until 2050 to effectively substitute operating expenses (OPEX) with capital expenditures (CAPEX). We assume that this amount cannot be financed from public sectors alone, but will require substantial private sector engagement.

To assess economic and financial implications of a DER project, a dynamic Life Cycle Cost & Benefit Analysis (LCCBA) case study was used to model cash flows (CF) of an office building renovated to the 'Passive House' standard. The model also includes an appraisal of debt and equity financing implications and a multi-parameter sensitivity analysis to analyse impacts of input parameter deviations. Subsequently, the 'Multiple Benefits' (MB) concept is applied to identify co-benefits of DER, which could make the business case more attractive. MBs identified approaches are categorized as 1) monetary, 2) unquantified project, and 3) societal benefits.

The DER project cash flow over a 25-year period reveals a 20-year dynamic payback with an IRR of below 3%. The levelised Cost of Heat Savings is 100 EUR/MWh with a 70% CAPEX cost share. The Loan Life Cover Ratio comes out to 1,3. Tangible pecuniary DER MB approaches identified are higher rents and real estate values, (employee) productivity, maintenance costs and CO2 savings, in addition to societal benefits.

Results of the dynamic LCCBA cash flow model provide solid grounds for DER business case analyses, project structuring and financial engineering, but also for policy design, compared to simpler economic modelling. CF from future energy cost savings alone are typically not enough to convince investors, however, they can co-finance DER investments substantially. Moreover, MBs can offer meaningful pecuniary contributions to make a business case attractive. Furthermore, the approach supports policy makers in their decision-making process to develop new policy measures in order to achieve 2050 goals.

To be continued in the June DSM Spotlight …

Excerpt from an ECEEEE Summer Study 2017 paper by Jan W. Bleyl, Energetic Solutions, Austria; Markus Bareit, Swiss Federal Office of Energy (SFOE), Switzerland; Miguel A. Casas, Energinvest, Belgium; Johan Coolen and Benjamin De Bruyn, Factor4, Belgium; Albert Hulshoff, AHB Consultancy, The Netherlands; Mark Robertson and Sarah Mitchell, EfficiencyOne, Canada.

For more information, please contact Task 16 Operating Agent, Jan Bleyl, energeticsolutions@email.de.

Switzerland

On The Way To A Nuclear-Free Energy System

The sun is shining on the snowcapped mountains and the mighty glaciers that deliver the water for our hydropower plants. A breeze of wind lets the wind turbines rotate in front of a herd of cows grazing in the meadow – producing biomass – and tweeting birds are sitting on a power line. Only a few clouds emerging from a nuclear power plant's cooling tower hang in the blue sky without hindering the generation of electricity from the nearby photovoltaic system. This picturesque view of Swiss electricity production shows a sufficient, environmental friendly and secure energy supply in which the need for Demand Side Management seems far away – but let's glimpse behind the scenes.

In Switzerland, we produced 66 TWh electricity in 2015. With almost two thirds from hydropower (60%) and other renewables (2.6%) and one-third from nuclear power; production was nearly CO2 free. However, electricity has only a share of one-quarter of the total energy consumption in Switzerland with most of the remaining three-quarters coming from fossil fuels.

After the severe nuclear accident in Fukushima, Japan in 2011, the Federal Council and Parliament decided on Switzerland's progressive withdrawal from nuclear energy production. The shutdown of one nuclear power plant is scheduled for 2019; the other four existing nuclear power plants may stay in operation for as long as they remain safe. The Swiss Federal Nuclear Safety Inspectorate (ENSI) is responsible for deciding whether the nuclear power plants meet the conditions for safe operation. ENSI is an independent authority of the Confederation. This decision, together with further far-reaching changes in the international energy environment, requires an upgrading of the Swiss energy system. For this purpose, the Federal Council has developed the Energy Strategy 2050, which looks at the whole energy system and not only electricity.

In September 2013, the Federal Council submitted to Parliament the first set of measures within the Energy Strategy 2050. The Federal Council wishes to significantly develop the existing potential for energy efficiency and exploit the potential of hydropower and the new renewable energies (sun, wind, geothermal, biomass). After three years of intense political discussions in the two chambers of parliament, the Federal Parliament decided on a set of measures and approved the total revision of the Energy Law as well as changes in various other Federal laws in a final vote in September 2016. Thereafter, a sufficient number of signatures were collected to request a referendum. Therefore, the Swiss people will have the final say and will vote on the first set of measures on May 21, 2017. If the law is accepted, it will be put into force on January 1, 2018.

The box on page 6 summarizes the first set of measures to promote energy efficiency and renewable energy in the Swiss Energy Strategy 2050. The first set of measures is mainly based on support programs, which includes subsidies and tax reductions that are paid by a CO2 levy or a charge on the electricity transmission cost (a feed-in tariff). A second set of measures will be more market oriented and replace the first set in five to ten years.

To accompany the Energy Strategy, the Federal Council developed a new Electricity Grid Strategy. The Energy Strategy 2050 and the upgrading of the energy system will make new demands on the electricity grids. The existing grids have to be adapted for the increasing fluctuation in the feed-in of electricity due to the development of wind and solar energy projects. Moreover, many power lines have now reached an age

In order to lead the way and act as a role model, the Federal Administration and enterprises close to the public sector signed a declaration of intent to increase their energy efficiency by 25% by the year 2020.

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Switzerland *from page 5*

Energy Strategy 2050 Phase I in a nutshell

Guiding values:

Subject	Value 2015	Value 2000/1990	Target/Guiding Value
Electricity consumption	209,690 TJ 58,246 GWh	188,540 TJ (in 2000) 52,373 GWh (in 2000)	- 3% in 2020 vs. 2000 - 13% in 2035 vs. 2000
Energy consumption	838,360 TJ 232,878 GWh	846,990 TJ (in 2000) 235,275 GWh (in 2000)	- 16% in 2020 vs. 2000 - 43% in 2035 vs. 2000
CO2 emissions	33.85 t CO2	39.23 t CO2 (in 1990)[1]	- 20% in 2020 vs. 1990 - 50% in 2030 vs. 1990 (at least 30% in CH)
Renewable Energy (excluding hydropower)	2,831 GWh	-	4,400 GWh in 2020 11,400 GWh in 2035
Hydropower (expected generation)	36,400 GWh	-	37,400 GWh in 2035

More information: www.energiestrategie2050.ch

[1] According to the Kyoto Protocol and the CO2 law, CO2 emissions from motor fuels caused by international aviation and navigation are not considered.

Measures to increase energy efficiency

- Buildings:
- Promotion of deep energy retrofit and investments in renewable energy
- Higher tax incentives for improving energy efficiency in buildings
- Mobility: CO2 emission targets for light duty and light commercial vehicles
- Industry:
- Energy efficiency measures to be exempted of CO2 levy
- Competitive calls for tender to finance electric efficiency measures
- Appliances: Energy labels and appliances regulations
- Smart Meter: Clear framework conditions for the introduction of Smart Metering

Approval Procedures

- Renewable energy: Shortening and streamlining
- Networks: Acceleration of licensing procedure

Measures to increase the use of renewable energy

- Promotion:
- Changeover from current feed-in remuneration at cost scheme to feed-in remuneration with direct marketing
- Market premium for existing power plants
- Investment contributions for new power plants
- Improvement of legal framework

Withdrawal from nuclear energy

- No new general licences
- Continued operation of existing power plants as long as their safety is guaranteed

From research to practice

- “Coordinated Energy Research” action plan – Swiss Competence Centres for Energy Research (SCCER)
- Pilot, demonstration and beacon programs

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Switzerland *from page 6*

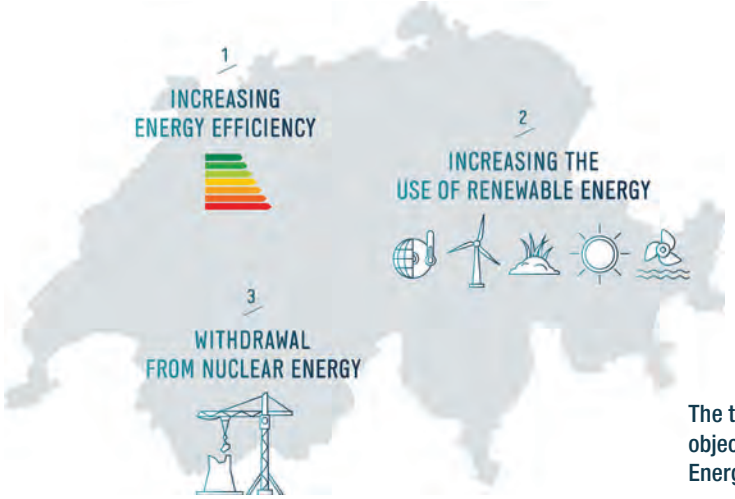
where they must be replaced, regardless of the energy strategy. With the Electricity Grids Strategy, the Federal Council wishes therefore to create the conditions for a legal framework for a need-based and timely grid development in order to guarantee the supply of electricity. The Swiss Parliament is currently debating the Electrical Grid Strategy.

For an efficient electricity grid, Demand Side Management (DSM), such as load management, plays an important role. DSM does not only cut the electricity costs of the consumer, but also reduces the need for load driven grid expansion and allows for more efficient planning and operation of distribution grids. IEA DSM Task 17: Integration of DSM, EE, DG and Renewable Energy Sources is investigating these topics, and the Swiss expert is able to share his experiences and profit from the knowledge of the other country experts.

Besides the above-mentioned energy efficiency measures, further major efforts are essential to achieve the energy conservation goals (see box). In order to lead the way and act as a role model, the Federal Administration and enterprises close to the public sector signed a declaration of intent to increase their energy efficiency by 25% by the year 2020. In addition, the Swiss Energy Program is conducting activities on awareness rising, information, consulting, education, etc. in the fields of energy efficiency and renewable energy. In this context, Switzerland profits from its participation in IEA DSM Task 16: Innovative Energy Services and IEA DSM Task 25: Business Models for a More Effective Market Uptake of DSM Energy Services. For example, the knowledge exchange in DSM Task 16 helped to put energy performance contracting (EPC) on the agenda of the Swiss energy efficiency market. And after a DSM Task 16 workshop in 2013, which brought EPC stakeholders together, the association swissesco was founded in 2015 and now a EPC pilot project in the public domain is taking shape.

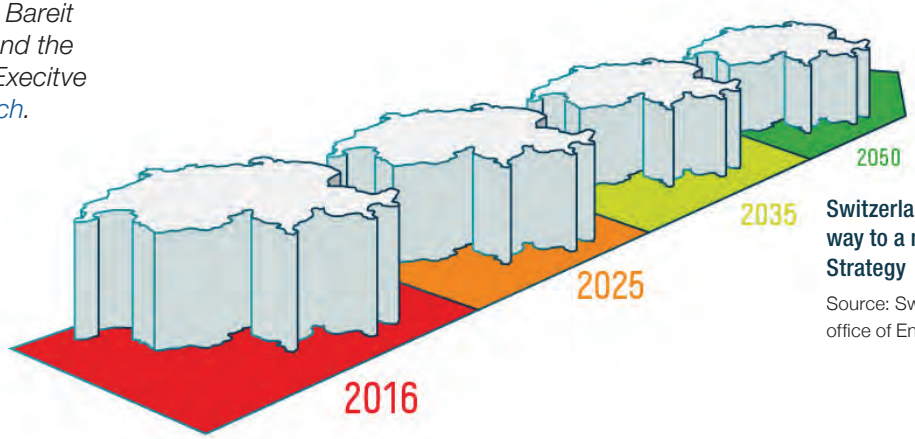
Switzerland is at the beginning of an important energy transition. The nuclear power plants will slowly disappear from the Swiss landscape and other technologies will expand. DSM will play an important role to keep this expansion in reasonable bounds and to guarantee energy security. Thus, the Swiss landscape remains as picturesque as it is today.

This article was contributed by Markus Bareit of the Swiss Federal Office of Energy and the Swiss representative on the IEA DSM Execitve Committee, markus.bareit@bfe.admin.ch.



The three strategic objectives of the Energy Strategy 2050

Source: Swiss Federal office of Energy (SFOE)



Switzerland on its way to a new Energy Strategy

Source: Swiss Federal office of Energy (SFOE)

DSMUNIVERSITY

This learning platform, jointly run between the IEA DSM Technology Collaboration Programme (DSM TCP) and Leonardo ENERGY, has a resource bank of over 28 recorded webinars (that often are supported by supplemental documents for more in depth study. These recordings can also be found on YouTube.

MARCH 23 WEBINAR

Integration Of Energy Efficiency And Renewable Energy – Multiple Benefits!

Peter Lund of Aalto University, Finland, will discuss the relationship of local renewable energy production and energy efficiency measures. The first half of the webinar will focus on the integration of these two in the built environment (where most of the energy is used). Dr. Lund will show how energy efficiency, in particular DSM, together with renewable energy and Power-to-X (X=heat, mobility, gas, etc.) measures could provide mainstream energy solutions in the large scale. The second half of the webinar will focus on the market side of integration, in particular the adoption and market up take up of new alternatives.

To register click here.

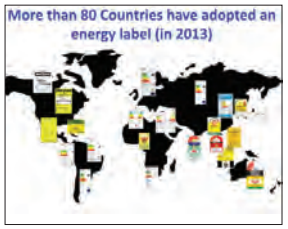
DSM today and tomorrow

A selected package from the DSM University

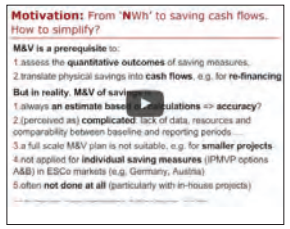
Where is energy efficiency and DSM heading? We can see some trends in the lectures and the documentation from our DSM University webinars. Here is a selection that you may find useful, simply click on the titles below.

DSM for the 21st century

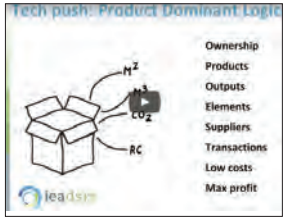
Energy Efficiency: a profit center for companies



A brief history of energy efficiency labelling



Simplified measurement & verification for energy, water & CO2-savings



What job is Energy Efficiency hired to do? A look at the business models

ieadsm.org

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