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# Solar Friendly Best Planning Practices for New Hampshire Communities

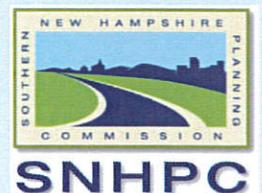


**A Quick Resource Guide for Planning Boards and Municipal Officials in  
Crafting Solar Friendly Regulations and Developing Solar Friendly  
Communities in New Hampshire**

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# Best Practices in Regulating Solar Energy Systems

## Introduction/Purpose

The purpose of this Resource Guide is to help Planning Boards and Municipal Officials (1) craft Solar Friendly Land Use Regulations in their Zoning, Site Plan and Subdivision Regulations; and (2) develop municipal plans, policies, procedures and practices to encourage the deployment and use of solar energy within their communities.

Funding for this project is provided through a U.S. Department of Housing and Urban Development (HUD) Sustainable Communities Program grant awarded in FY 2013/2014 to the nine regional planning commissions in NH.

Municipalities in NH currently have very few best practices they can call upon in establishing practical land use regulations and sound plans for the deployment of solar energy within their communities.<sup>1</sup> The cost of Solar Photovoltaic (PV) Systems has been decreasing in the past several years and installation costs are expected to continue to decrease in the future. As a result solar energy is driving significant economic growth across the US. Every state in the country, including NH, receives as much, or more, sunlight than Germany, which currently leads the world in Solar PV installation and energy production.<sup>2</sup>

New Hampshire can also be a leader in solar energy and expand opportunities for solar growth in the state. Promoting solar energy through planning and land use regulations involves identifying and removing unintended barriers and enacting appropriate standards for solar development in zoning, subdivision, site plan regulations and building codes. Communities can also use their development regulations, administrative procedures and processes, and financial tools to incentivize solar energy use.

Some of the most important ways planners can influence and promote solar energy is to provide information and direct assistance to interested property owners and developers considering solar installations; advocate for including solar energy in local plans and development proposals; and crafting solar friendly regulations and administrative approval processes which reduce or avoid lengthy and costly land development reviews. In addition, municipalities can play a significant role in promoting solar energy through public-private partnerships and redevelopment projects, including mixed-use developments; brownfields development; downtown revitalization; affordable housing; and transit-oriented development – all of which offer the potential to integrate solar into the final design and construction process.

Public buildings, structures and facilities, such as city/town halls and office buildings, libraries, schools, parking garages, police and fire stations, landfills, and parks all have solar potential. Installing solar energy systems at these locations – either attached to the roof or mounted to the ground – can help

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<sup>1</sup> The NH Office of Energy Planning is currently developing a model ordinance for municipalities in regulating residential Solar PV Energy under a DOE Rooftop Solar Challenge Grant. This Quick Resource Guide is offered in advance of and to supplement this work under the HUD Sustainability Project.

<sup>2</sup> American Planning Association, Planning for Solar Energy, Planning Advisory Service Report #575, page 27.



meet local energy goals, reduce local energy costs, and most importantly provide the community with a long term and sustainable environmental and economic investment in the future.

This Resource Guide consists of two tools: (1) a Checklist identifying best practices Planning Boards and Municipal Officials can use in developing solar friendly regulations; and (2) a Worksheet that Planning Boards and Planners can share with property owners and developers to implement passive solar-friendly site design techniques and principles in subdivision and site plans. The Checklist and Worksheet developed for this Resource Guide are based on a number of model ordinances and permitting guides, including the Connecticut Rooftop Solar PV Permitting Guide<sup>3</sup> and the American Planning Association PAS Report #575, Planning for Solar Energy.<sup>4</sup>

In addition to these tools, the Southern New Hampshire Planning Commission recently completed (1) a comprehensive Wind/Solar Renewable Energy Community Survey conducted among 15 municipalities located within the Southern New Hampshire Region (see link to the Summary Report and Findings at: <http://www.snhpc.org/pdf/WindSolarSurvey2014.pdf>); and (2) a pilot study evaluating local zoning and planning regulations with respect to wind and solar energy development in the towns of Candia and Derry, NH.

Both the renewable community energy survey and the pilot study offer suggestions for how municipalities can improve their land use and planning regulations and permitting procedures to advance and promote solar energy for the benefit of community residents.

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<sup>3</sup> Adapted from Connecticut Rooftop Solar PV Permitting Guide, Model Zoning Ordinance, 5.1.2014.

<sup>4</sup> See American Planning Association, Planning for Solar Energy, Planning Advisory Service Report #575, and page 27.



## A Checklist in Developing Solar Friendly Land Use Regulations

Establish Zoning Definitions	
<p><b>First Step (Establish Definitions):</b> Many zoning codes fail to identify and define the specific terms and the various types of solar energy systems currently available in the marketplace. The lack of definitions in your zoning code can create uncertainty about the legality of solar use and development in your community. Some communities choose to distinguish between solar thermal and solar photovoltaic (PV) systems, but many others use “solar energy system” or a similar broad term, to refer to any type of solar collector and its associated equipment. Thus, it is important that your Zoning Ordinance clearly define all the terms and types of solar energy systems available. This will help to avoid confusion and prevent inconsistent zoning interpretations.</p>	
Solar Best Practice	References
<p>1. Add terms and definitions of solar energy systems to your Zoning Ordinance. Recommended definitions are provided in the References column.</p>	<ul style="list-style-type: none"> <li>• <b>Solar Photovoltaic (PV) System:</b> A solar collection system consisting of one or more building systems, solar photovoltaic cells, panels or arrays and solar related equipment that rely upon solar radiation as an energy source for collection, inversion, storage and distribution of solar energy for electricity generation.<sup>3</sup></li> <li>• <b>Photovoltaic (PV):</b> A semiconductor based device that converts sunlight directly into electricity.<sup>3</sup></li> <li>• <b>Solar Thermal System:</b> A solar collection system that directly heats water or other liquid using sunlight. The heated liquid is used for such purposes as space heating and cooling, domestic hot water, and heating pool water.<sup>3</sup></li> <li>• <b>Roof Mounted Solar Energy System:</b> A solar photovoltaic or thermal energy system attached to any part or type of roof on a building or structure that generates electricity. This system also includes any solar photovoltaic-based architectural elements.<sup>3</sup></li> <li>• <b>Free Standing Solar Energy System:</b> A pole or ground mounted solar photovoltaic or thermal energy system that generates electricity. This system also includes any solar photovoltaic-based architectural elements.<sup>3</sup></li> </ul>



	<ul style="list-style-type: none"><li>• <b>Community Solar:</b> Refers to solar photovoltaic (PV) systems where community members own shares in the solar system; can subscribe to receive the generated solar power; or can purchase the output of the solar PV system to offset their own electricity bills.<sup>4</sup></li><li>• <b>Building-Integrated Solar Photovoltaic System:</b> A solar energy system that consists of integrating photovoltaic modules into the building structure, such as the roof or the façade, and which does not alter the relief of the roof.<sup>3</sup></li><li>• <b>Solar Farm or Garden:</b> Refers to a system of solar arrays designed to capture sunlight and convert it to electricity primarily for offsite consumption and use. Some electricity may be used by an onsite building or structure.<sup>4</sup></li><li>• <b>Solar Photovoltaic (PV)-based Architectural Element:</b> Structural/architectural element that provides protection from weather that includes awnings, canopies, porches or sunshades and that is constructed with the primary covering consisting of solar PV modules, and may or may not include additional solar PV related equipment.<sup>3</sup></li><li>• <b>Solar Photovoltaic (PV) Related Equipment:</b> Items including a solar photovoltaic cell, panel or array, lines, mounting brackets, framing and foundations used for or intended to be used for collection of solar energy.<sup>3</sup></li><li>• <b>Passive Solar Energy Techniques:</b> Site design techniques which maximize solar heat gain, minimize heat loss, and provide thermal storage within a building. These techniques include, but are not limited to: (1) building orientation; (2) street and lot layout; (3) vegetation; (4) natural and man-made topographical features; and (5) protection of solar access within the development.<sup>3</sup></li></ul>
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**Lighten Up Zoning and Planning Use Restrictions**

**Second Step (Exempt Roof Top Systems from Zoning and Make Solar Energy a Permitted Use in All Zoning Districts):** Municipal zoning and planning regulations can adversely impact a residential homeowner, business or a property owner’s ability to install a solar energy system. Solar energy systems (both roof and free standing or ground mounted systems) are typically classified as an “accessory use” or as an “accessory structure” and are subject to the same regulations as any other accessory use or structure on the same lot in a zoning district. Often these regulations can be overly restrictive and prevent a solar energy system from being located in a way that would be the most efficient (in terms of maximizing the energy production of the system) or even prevent the system from being installed altogether. There are a number of positive approaches and best practices that can be considered, and if adopted, could help make your municipal zoning and planning regulations more solar-friendly.

Solar Best Practice	References
<ol style="list-style-type: none"> <li>1. Consider exempting all Roof Mounted and Building Integrated Solar Energy Systems (or those meeting certain criteria) from all zoning review and site planning regulations.</li> <li>2. Consider classifying all Roof Mounted and Building Integrated Solar Energy Systems as “Mechanical Equipment” and exempt these systems from all zoning review similar to other heating, cooling and mechanical energy related equipment commonly found on buildings.</li> <li>3. Consider treating all Free Standing or Ground Mounted Solar Energy Systems which can be defined as an accessory use or as an accessory structure subordinate to the principle structure or use on the same lot as “Permitted by Right” subject to certain standards in all Zoning Districts.</li> <li>4. Consider treating all Free Standing or Ground Mounted Solar Energy Systems as a “Permitted Use” in all Commercial, Office and Industrial Zoning Districts and as a Conditional Use in Residential Districts under RSA 674:21. A Conditional Use Permit ensures that the Planning Board and the public have an adequate opportunity for review and comment.</li> </ol>	<ul style="list-style-type: none"> <li>• Roof mounted and building integrated solar energy systems – PV and Thermal – that are attached to or are built as part of the building or roof - should be exempt from all zoning and site plan review.</li> <li>• Mechanical heating, cooling and energy systems are already regulated under your municipality’s building and electric codes and are required to have building and electric permits for installation. In many communities, mechanical equipment is “exempt” from zoning requirements, including building height and site planning regulations.</li> <li>• Many communities classify solar energy systems as an accessory use or as an accessory structure (similar to a tool shed or garage). Some communities’ exempt small accessory structures under 1,000 square feet in size from all zoning, planning and building codes, except for certain standards such as building setbacks.</li> <li>• A Free Standing or Ground Mounted Solar Energy System which is the principal or primary use on a lot (such as a solar farm or garden) typically contains a large number of solar panels organized as solar arrays. Many communities allow these free standing solar systems as a “Permitted Use” in all Commercial, Office and Industrial Zoning Districts, subject to existing district requirements. These systems can also be “Permitted by Right” in certain residential districts (such as Mixed Use or Rural Districts) or allowed as a “Conditional Use” in all Residential Districts under RSA 674:21.</li> </ul>



<p>5. Mitigate land use impacts for Solar Energy Systems. At most, some planning concerns include: compatibility with adjacent residential areas; building setbacks and lot coverage; visual impacts and screening; physical access; and security.</p>	
<p><b>Evaluate Development Standards More Closely</b></p>	
<p><b>Third Step (Exempt Solar Energy from Certain Development Standards such as Dimensional and Lot Coverage Requirements):</b> Appropriate sites and locations for solar energy can be challenging given the architectural characteristics and locations of existing buildings, existing topographic conditions and lot configurations, surrounding tree coverage, and physical site access, etc. Zoning and planning regulations need to recognize these factors, be more flexible and allow for the placement of solar energy systems where solar radiation is most abundant. The following dimensional standards should be waived or made more flexible in your zoning and planning regulations: building height regulations, setback requirements, and lot and impervious coverage restrictions. Exempting solar energy from these development standards can enhance solar energy deployment for land owners, businesses and residential home owners without impacts to the community.</p>	
<p><b>Solar Best Practice</b></p>	<p><b>Reference</b></p>
<ol style="list-style-type: none"> <li>1. Consider exempting all solar energy systems from building height restrictions in your zoning and planning regulations.</li> <li>2. Consider exempting all roof mounted and building integrated solar energy systems from all your building setback requirements even if these systems extend beyond the building footprint as solar energy systems are mechanical appurtenances to the building.</li> <li>3. Consider exempting or waiving all solar energy systems from lot coverage and Floor Area (FAR) requirements. These lot coverage requirements can prevent the design of a solar energy system from maximizing the available solar gain on a site.</li> </ol>	<ul style="list-style-type: none"> <li>• Exemptions from building height requirements for rooftop solar energy systems should be similar to exemptions given for rooftop appurtenances such as a chimney, television antennae, rooftop mechanical equipment, etc. Exemptions from building height restrictions for free-standing (e.g. ground and pole-mounted systems) should also be provided. Similar exemptions and waivers should also be applied in your Planning Board site plan regulations and historic district provisions.</li> <li>• All roof mounted and building integrated solar energy systems can be exempt from building lot setback requirements (e.g. front, side and rear yard setbacks). These setbacks could also be reduced for free standing and ground mounted systems. Lot setback requirements can impact solar PV systems depending on where on a site the best access to sunlight is available.</li> </ul>



<p>4. Exclude free standing and ground mounted solar energy systems from impervious surface regulations, or the impervious surface calculation should be limited only to the system’s footings (the parts of the solar system that make contact with the ground). Free-standing solar systems do not cap the ground or prevent water absorption.</p>	<ul style="list-style-type: none"> <li>Free standing and ground mounted solar energy systems should be excluded from counting towards lot coverage, FAR and impervious surface requirements, as the contact with the ground is limited to only the footings. This is significant as local zoning laws typically set maximum impervious surface coverage percentages. The application of these percentages can be confusing to municipal officials in determining whether solar panels should or should not constitute an impervious surface.</li> </ul>
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**Update Historic District, Subdivision and Site Plan Regulations**

**Fourth Step (Update Historic District, Subdivision and Site Plan Regulations):** Local historic district (planning and zoning requirements), subdivision and site plan regulations should all be reviewed and updated to address the best practices and recommendations as outlined in this resource guide. Local regulations also need to be updated to promote the benefits of renewable solar energy; streamline the approval process and the deployment of solar energy systems; and promote the use of passive solar techniques while protecting the visual character and appearance of your community.

Solar Best Practice	Reference
<p>1. Locate and design all solar energy systems to respect the historic character and integrity of existing buildings and properties. It is important that local historic regulations and guidelines allow solar energy similar to other mechanic equipment and that local regulations provide opportunities and prescriptive standards for solar installations.</p>	<ul style="list-style-type: none"> <li>Update local historic district regulations and planning guidelines to allow for and provide opportunities for the deployment of all solar energy systems, including the issuance of a Certificate of Appropriateness for these systems.</li> <li>Add clear prescriptive standards to local guidelines which would allow for example (1) flush mounted solar panels on all existing roofs and (2) the installation of roof and free-standing and ground mounted solar panels to historic buildings and properties which are not visible from the street or are located in rear or side yards which do not “substantially impair” the historic appearance or visual character of the district or neighborhood.<sup>5</sup></li> </ul>

<sup>5</sup> For examples of prescriptive standards see the National Trust for Historic Preservation Design Guidelines for Solar Installations, the National Alliance of Preservation Commission’s Sample Guidelines for Solar Systems in Historic Districts, or NREL’s Implementing Solar PV Projects on Historic Buildings and in Historic Districts.



<ol style="list-style-type: none"><li>2. Consider updating both historic district and site plan regulations to allow solar energy systems to be approved through a no-cost administrative review. Adding prescriptive standards to planning regulations can help streamline approval for projects meeting specific criteria. Local planning regulations should not be used to exclude projects which do not impair the historic or visual character of your community.</li><li>3. Update Planning Board’s site and subdivision regulations to set up administrative procedures and waivers for site and subdivision plan approvals particularly for free-standing or ground mounted systems. The cost in preparing these plans can be prohibitive and prevent the solar energy system from being installed.</li><li>4. Encourage new development to utilize Passive Solar Energy techniques when planning and building a new building or new development. See the following Solar Site Design Worksheet for a Proposed Subdivision or Site Plan.</li><li>5. Consider adding solar access rights to site planning and subdivision regulations. Issues such as shade from vegetative growth over time and the addition of new structures on abutting properties can be a long term threat for solar energy system performance. Often solar easements are needed to ensure an abundant source of sunlight will be available.</li></ol>	<ul style="list-style-type: none"><li>• Work with local Planning Board to establish procedures for administrative site and subdivision plan approval for free standing and ground mounted solar energy systems or procedures for the waiver or amendment of these plans that can be approved by the Municipal Planner or Planning Board under certain requirements.</li><li>• Encourage or require street and lot layout and new home and building development in new subdivision and site plans to be arranged and oriented to maximize solar gain.</li><li>• Encourage or require the planting of vegetation that is both supportive of passive heating and cooling solar radiation techniques as well as providing and addressing opportunities and needs in screening large solar arrays.</li><li>• Adopt the NH Solar Sky space Easement (see NH RSA 477:51) that protects the owner’s right to sunlight on their property. See: <a href="http://www.dsireusa.org/solar/solarpolicyguide/?id=19">http://www.dsireusa.org/solar/solarpolicyguide/?id=19</a> (NH Solar Access Law).</li><li>• Encourage or require roofs in new development and buildings to be built “Solar Ready” for future installation of a solar energy system.</li><li>• Encourage or require in new development and buildings appropriate plumbing, wiring, heating and water systems to accommodate existing and future installations of solar energy systems.</li></ul>
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<p>6. Consider in municipal master plan a Natural Resource Inventory and other land use plans and regulations, the identification of your community’s solar resources (appropriate lands and opportunities) and work to protect and promote the use of these resources for community-wide and local benefits in renewable solar energy.</p>	
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**Streamline Planning and Building Permit Processes**

**Fifth Step (Streamline Planning Review and Building Permitting Process):** Getting an approval to install a solar energy system is in most cases a multi-step process and can be very time consuming and costly for property owners and solar contractors. Applicants may be less prone to install solar energy systems because of lengthy review and permitting processes and the amount of time and cost needed for both planning and building permit approvals.

Solar Best Practice	Reference
<ol style="list-style-type: none"> <li>To facilitate the installations of all solar energy systems establish a standard "one stop" solar permit process and a one-time flat application fee for both planning review and building permit applications.</li> <li>As part of a "one stop" solar permit, include a checklist that outlines your municipality’s requirements for installing all types of solar energy systems. A checklist will help to improve consistency and reduce guesswork among applicants and contractors.</li> </ol>	<ul style="list-style-type: none"> <li>Many examples exist across the country where municipalities are putting in practice a "one stop" solar permit and flat fee for solar installations. See following link for the Connecticut solar permit at: <a href="http://www.energizect.com/sites/default/files/uploads/Solar%20PV%20Permit%20Application%20Supplement%20F%20V2%208.18.14.pdf">http://www.energizect.com/sites/default/files/uploads/Solar%20PV%20Permit%20Application%20Supplement F V2 8.18.14.pdf</a>.</li> <li>Also see the Connecticut Structural Review Worksheet at: <a href="http://www.energizect.com/sites/default/files/uploads/%285%29%20CT%20Solar%20PV%20Structural%20Review%20Worksheet%20v1.0.pdf">http://www.energizect.com/sites/default/files/uploads/%285%29%20CT%20Solar%20PV%20Structural%20Review%20Worksheet%20v1.0.pdf</a>.</li> </ul>

**Consider Developing Local Solar Incentives**

**Sixth Step (Consider Establishing a PACE District):** The cost of installing a solar energy system for a residential dwelling or a business can be costly and require significant upfront capital in order to pay for the solar system installation. To help address this issue, the New Hampshire planning statutes allow municipalities to develop local financing incentives to help residents and property owners pay for the cost of solar installations. The Property Assessed Clean Energy District (PACE) under NH RSA Chapter 53-F offers municipalities a new financing tool to address this issue.



Solar Best Practice	Reference
<p>1. Consider establishing a <b>Property Assessed Clean Energy District (PACE)</b> under NH RSA Chapter 53-F in certain areas and corridors in your community. These districts can also be used to promote solar installations for business growth and development through local financing incentives and loans.</p>	<ul style="list-style-type: none"> <li>• PACE: See NH RSA Chapter 53-F; also see NH Office of Energy and Planning resource guide on Energy Efficiency and Clean Energy Districts at: <a href="http://www.nhoep.org">www.nhoep.org</a>; and Commercial- PACE Financing Moves Forward, New Hampshire Town and City, September/October 2014 at: <a href="http://www.nhmunicipal.org/TownandCity/Article/589">www.nhmunicipal.org/TownandCity/Article/589</a></li> </ul>
<p><b>Begin Planning for Solar Energy</b></p>	
<p><b>Final Step (Start Planning):</b> There are many opportunities for solar planning as part of your community development activities and master plans. It is important that you begin to plan now and work toward advancing and implementing solar energy among all sectors of the community, including municipal, residential, educational, and business development and use.</p>	
Solar Best Practice	Reference
<p>1. Encourage “<b>solar arrays</b>” to be built on brownfield sites, former sand pits, municipal landfills, public buildings and facilities, schools, libraries, police and fire stations, transfer stations, water and wastewater treatment plants and parks to produce clean and renewable energy and reduce electrical costs for municipal buildings and property owners.</p> <p>2. Consider establishing a “<b>Community Solar</b>” project under the new Group Net Metering (GNM) laws to benefit your municipality and community residents.</p> <p>3. Establish a formal <b>Energy Commission</b> for your municipality as provided by RSA 38-D.</p> <p>4. Develop an <b>Energy Chapter</b> in your municipal master plan which includes and promotes solar energy use and development in your community.</p>	<ul style="list-style-type: none"> <li>• Solar arrays can be privately owned; publicly owned; or leased to a 3<sup>rd</sup> party investor and the electricity produced can be sent back through a meter to the grid or utilized behind the grid to power your buildings and facilities.</li> <li>• New Hampshire’s Group Net Metering (GNM) – See RSA 362-A:9,XIV and for laws and rules -- See PUC website at: <a href="http://www.puc.nh.gov/sustainableEnergy/GroupNetMetering.html">www.puc.nh.gov/sustainableEnergy/GroupNetMetering.html</a></li> <li>• For Energy Commissions -- See RSA 38-D at: <a href="http://www.nh.gov/oep/resource-library/energy/index.htm">www.nh.gov/oep/resource-library/energy/index.htm</a></li> <li>• For Master Plan Energy Chapters – See New Hampshire Local Energy Solutions – at: <a href="http://www.nhenergy.org/master-plan-energy-chapters.html">www.nhenergy.org/master-plan-energy-chapters.html</a></li> </ul>



## Solar Site Design Worksheet for New Subdivisions and Site Plans

**HAVE YOU INCLUDED ANY OF THE FOLLOWING SOLAR-FRIENDLY DESIGN PRINCIPLES IN YOUR SUBDIVISION and SITE PLAN? (Check all below elements that apply)**

Note that solar-friendly design is not required for subdivisions and site plans; however, developers are strongly encouraged to include solar-friendly design elements in their plans.

### Street and Lot Layout

- Home and building lots are arranged on streets that run within 20 degrees of east/west to maximize solar exposure

### House Orientation

- Homes and buildings are designed in a manner so that the longer axis of the house or building is aligned within 20 degrees of east/west in order to maximize solar exposure
- Homes and buildings are designed so that south-facing roof surfaces (and more generally, sections of the roof ideal for placement of solar energy systems) receive unobstructed sun between 9 am and 3 pm
- Homes and buildings are designed so that primary living and office spaces include a southern exposure
- Homes and buildings are designed so that at least 50% of window area contributes to passive heating during the heating season and are shaded in the cooling season
- Roof structures that might create shading and block solar panels are installed on the north slope of the roof to minimize impacts

### Vegetation

- Plantings support passive heating and cooling techniques and do not shade roof surfaces ideal for solar energy systems

### Protection of solar access within the development

- Subdivision and site plan regulations protect the property owner or homeowners' right to install solar and eliminate potential obstructions from neighboring structures or vegetation

For any of the above design principles that were not included in your subdivision/site plan, please explain why:

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