

Country Condition Sheet

Solar Urban Planning of Portugal

1. Political framework conditions

1.1. National goals

Reduction of GHG emission base year 1990	20% until 2020 in accordance with the European targets
Share of renewable energy in final energy consumption	31% by 2020 (in the Ministers Council Resolution n.º 29/2010 from the 15 th April 2010, http://dre.pt/pdf1sdip/2010/04/07300/0128901296.pdf)
Share of renewable energy in electricity consumption	60% by 2020 (in the Ministers Council Resolution n.º 29/2010 from the 15 th April 2010, http://www.dre.pt/pdf1sdip/2010/04/07300/0128901296.pdf)
Share of renewable energy in final energy consumption for heat space heat, cooling and process heat and hot water	Not applicable
Reduction of primary energy consumption base year 2008	reduce by 10% the final energy consumption based on energy efficiency improvement until 2015 (in the Ministers Council Resolution n.º 80/2008 from the 20 th May 2008, http://www.dre.pt/pdf1sdip/2008/05/09700/0282402865.PDF)
Rate of building renovation	22,1% in the total number of construction works occurred in 2009 (according to the National Statistics Institute. A new set of incentives for urban refurbishment was presented in the Ministers Council Resolution n.º 20/2011 from the 23 th March, http://juventude.gov.pt/Legislacao/Documents/Resolucao_Conselho_de_Ministros_20_2011.pdf)

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2. Legal framework conditions

2.1. Urban planning

Legislation/ Obligations/ Minimal requirements
Urban land use planning
<ul style="list-style-type: none"> National Soils Policy, Decree-Law n.º 794/76, from the 5th November 1976 Establishes the fundamental policy on soils occupation. Defines the process and set of documentation to be developed when defining land occupation. http://www.dgotdu.pt/detail.aspx?channelID=4E1A62A3-7E4B-4898-8669-847FE339C09F&contentId=5CC84DA4-F40B-4903-B7F8-A06A952540DD
Local characteristics
<ul style="list-style-type: none"> Lisbon's Master Plan – Ministers Council Resolution n.º 94/94, 14th July Presently under revision, the new Plan establishes the intervention priority areas, as well as the level of intervention, according to the different scales of intervention: urban plan, block plan and/or allotments. http://pdm.cm-lisboa.pt

2.2. Passive Solar

Legislation/ Obligations/ Minimal requirements
<ul style="list-style-type: none"> RJUE – Juridical framework for urbanization and edification, Decree-Law n.º 555/99 from the 16th December 1999 Within this Decree-Law, article 58 establishes that any construction or reconstruction work must consider the existence of natural light improving the building orientation and design towards receiving direct solar radiation. Article 59 defines the minimum distances between buildings, as well as the building maximum height depending on the surrounding constructions, in order to assure that every building receives a minimum solar radiation in the facades for a minimal period of the day, in what is known as the 45 degrees rule. http://dre.pt/pdf1sdip/2010/03/06200/0098501025.pdf
Local characteristics
<ul style="list-style-type: none"> RMUEL - Municipal Framework for Urban Edifications in Lisbon, Lisbon's Council note n.º 1229/2009 Within this framework the Lisbon Municipality establishes in article 61º a set of parameters dedicated to the control of solar gains, article 62º establishes parameters to promote natural ventilation and article 63º highlights the importance of using renewable energy technologies. http://www.cm-lisboa.pt/archive/doc/RMUEL.pdf

2.3. Photovoltaic PV/ Solar thermal

Legislation/ Obligations/ Minimal requirements
<ul style="list-style-type: none"> Solar Thermal Thermal Performance Building Regulation (RCCTE) (Decree- Law n.º 80/2006 from the 6th April 2006) Improves the previous regulation, almost duplicating the thermal performance request in new and renovated buildings and imposing the usage of solar thermal collectors for hot water production if there is favourable conditions for exposure (if the roof or cover runs between SE and SW without significant obstructions) in a base of 1sqm per person (the

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total can be reduced up to 50% if space is necessary for other important usages of the building).)

http://lisboaenova.org/index.php?option=com_wrapper&Itemid=446

Air Conditioning Energy Systems Regulation (RSECE) (Decree- Law n.º 79/2006, from the 6th April 2006)

It imposes as mandatory priority, the consideration in both new buildings and major renovations, with the exception of fault of technical availability demonstrated by the designer under a mandatory methodology, the usage of flat solar collector systems for hot sanitary water production.

http://lisboaenova.org/index.php?option=com_wrapper&Itemid=447

- **Solar Photovoltaic**

No legislation imposes the use of solar photovoltaic systems

Local characteristics

- **Solar Thermal**

RMUEL - Municipal Framework for Urban Edifications in Lisbon, Lisbon's Council note n.º 1229/2009

Imposes tighter restrictions to the solar thermal adoption national obligation in article 63º, point 3:

- Buildings should have a User Manual that characterizes the building energy performance and, among other functionalities, defines the adopted systems to provide sanitary hot water;
- The adoption of centralized solar thermal systems is compulsory in new buildings and should consider South Orientation, architectural integration and the hot water storage tank should be concealed.

- **Solar Photovoltaic**

RMUEL - Municipal Framework for Urban Edifications in Lisbon, Lisbon's Council note n.º 1229/2009

In article 63º, point 8, it is set that the integration of renewable energy technologies should be considered whenever technically and economically viable.

2.4. Opportunities for future improvements

- Promote a wider dissemination of the results produced under the influence of the policies created. Foster a loop back information cycle to improve policies according to users feedback and allow users to benefit among them the experiences and benefits from the solar systems.
- Creation of an updated database with the geo reference of the installed solar system and energy produced – open data!
- In the case of solar thermal systems, within Lisboa E-Nova's participation in the European project PROSTO, the following opportunities were identified to mainstream STS adoption:
 - National level: Develop a good practices guide lines booklet on the integration of centralized solar thermal systems.

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- Local level:
- Develop a web page dedicated to clarify RMUEL (Municipal building regulations) proceedings that must be adopted by promoters;
- Make compulsive the inclusion of the building's user manual in the documents given to any new owner, as this will contribute to the correct integration and maintenance of solar thermal systems;
- Obligation to present in the technical projects approval phase the solar thermal system execution project and the definition of expected performance. This information would be later cross-checked with the on-going monitoring data;
- Obligation to install monitoring systems in each solar thermal system transmitting energy production data in real time to a central location.

3. Economic framework conditions

3.1. Urban planning

Subsidy/ grants
<i>National programs</i>
<ul style="list-style-type: none"> • The National Strategic Reference Framework – QREN Constitutes the framing for the application of the Community's policy for economic and social cohesion in Portugal for the 2007-2013 period. Within this framework several urban requalification projects are financed aiming mainly at the requalification of problematic areas or development of innovative concepts as eco-neighborhoods. http://www.qren.pt/index.php?lang=1
Favourable credit/ soft loans
<ul style="list-style-type: none"> • Depending on the framework, the funding for each type of project can go from 50 to 75%. Regarding urban planning projects only the Municipalities can apply for these types of funding.
Tax privilege
<ul style="list-style-type: none"> • Not applicable
Cost effectiveness / Example
<ul style="list-style-type: none"> • Not applicable

3.2. Photovoltaic/ Solar thermal

Payment tariffs
<ul style="list-style-type: none"> • Feed-in tariffs Solar PV: Renewables in the Hour – Microgeneration and minigeneration <u>Decree Law 118-A/2010 from 25th October</u> Under this framework the connection of a micro-generation system requires the pre-existence of a low voltage electricity supply contract, being the maximum connection power 3.68kWp, or 50% of the contractual power. The feed-in-tariff in force is fixed although divided in two different time scales. <u>Decree Law 34/2011 from 8th March</u> Within the mini generation framework the system has also to be connected to a low or medium voltage supply contract and the maximum licensable power are 250kWp. The feed-in-tariff is established for systems up to 20kWp. For installations with a higher connection power the feed-in-tariff is subjected to an auction. The maximum installable power is conditioned to 50% of the power contracted under the energy supply contract

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<p>and the electricity generated in the year x cannot overcome 50% of the electricity consumed within the local supply contract in year x-1.</p> <p><u>www.renovaveisnatura.pt</u></p> <ul style="list-style-type: none"> • Renewable Portfolio Standard (RPS) ----
<p>Subsidy / grants /</p> <p>The acquisition of renewable energy technologies is deductible in IRS (internal revenue service), 30% of the total investment up to a maximum defined in the Yearly State Budget (in 2011 the maximum was 803€).</p>
<p>Favourable credit / soft loans</p> <p>There are some banks that offer attractive credit conditions for the acquisition and installation of renewable energy technologies, namely the state bank Caixa Geral de Depósitos <u>https://www.cgd.pt/Particulares/Casa/Credito-Lar/Pages/Energias-Renovaveis.aspx</u></p>
<p>Tax privilege</p> <p>The VAT applicable to the acquisition of renewable energy technologies is the maximum one, 23%, so no privileges exist.</p>
<p>Cost effectiveness</p> <p>Considering the present average of investments and the feed-in-tariff in force, the medium return period is around 8 to 10 years for a micro-generation system with 3,68kWp and 2sqm of solar thermal collectors.</p>

3.3. Opportunities for improvements

- Define incentives for the standardization of solar passive homes. Promote further integration of solar passive requirements in building thermal performance regulations;
- Foster the development of innovative applications in micro and mini generation systems, engaging promoters into innovative solutions, like building and urban structure integration, etc; Innovative applications should be highly regarded and accounted for in the allocation of licensed project within the feed-in-tariff scheme.
- In the case of solar thermal systems, within Lisboa E-Nova's participation in the European project PROSTO, the following opportunities were identified to mainstream STS adoption:
 - Solar thermal systems have a VAT rating of 12%, solar systems components and collectors have a VAT rating of 20% and basic services such as electricity and natural gas have a VAT rating of 5%. As it is relevant to pass a coherent top-down message to the promoter, the Municipality could create a financial incentive and cover the difference between the higher VAT ratings and the lowest – 5%;
 - Building permits for the installation of solar thermal systems in existing buildings should be highly facilitated and financially supported via tax deductions;

The Strategic Planning Department of the Lisbon Municipality, should create the obligation for all car wash installations to install solar thermal systems for hot waters production.

4. Technical framework conditions

4.1. Urban planning

<p>Planning background of solar settlement</p> <ul style="list-style-type: none"> • Not applicable
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Potential
<ul style="list-style-type: none"> • Not applicable
Best practices/ Examples
<ul style="list-style-type: none"> • Baixa Pombalina Solar Potential Map <p>Within the Baixa Pombalina Requalification Plan that defines the guidelines for urban intervention in this area, the assessment of the built patrimony potential for integrating solar technologies was included. This aimed to promote the integration of solar systems in the process of building refurbishment according to the cultural heritage requirements. Using editable drawings of the area and aerial Photos it was possible to define each roof's areas and orientation through ArcGis. The next step involved stakeholders' consensus on identifying the exceptions due to their historical value. An average tilt for the roof's in the intervention area and associated productivity (kWh/sqm) was assessed both for PV and ST systems.</p> <p>The information was compiled on a map. http://lisboaenova.org/images/stories/PROSTO/CartaPotencialSolarBaixa.pdf</p>

4.2. Passive Solar

Planning background/ Local characteristics

Potential

Best practices/ Examples
<ul style="list-style-type: none"> • Solar XXI Building <p>Solar XXI buildings is a prototype of low energy office building where passive and active solar strategies have been applied to reduce the use of energy for heating, cooling and lighting, combining also an extensive photovoltaic façade for electricity production. Solar XXI was built in 2006 and is considered a high efficient building, close to a net zero energy building (NZEB), because the difference between the energy consumed and that produced is 1/10th of the energy consumed by a standard new office building. Its design includes a large number of energy efficiency concepts, such as a high insulated envelope, south sun exposure, windows shading, ground coling or stratification and cross ventilation. The windows solar gains and the effectiveness of shading devices were proved correlating soalr radiation, external and indoor air temperatures. It was also verified that ground cooled air has a temperature close that theoretical expected. (source: Gonçalves, H.; Panão, M. (2010)“Solar XXI building : proof of concept or a concept to be proved?” : http://repositorio.Ineq.pt/bitstream/10400.9/661/1/SOLARXXISB10.pdf http://www.Ineq.pt/download/4078/BrochuraSolarXXI_Dezembro2005.pdf</p>

4.3. Photovoltaic/ Solar thermal

Planning background/ Local characteristics

Potential

Best practices/ Examples
<ul style="list-style-type: none"> • Solar XXI Building • São Bartolomeu residential towers

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Located at Lisbon's Uptown Area. Jardins de São Bartolomeu Condominium is a high level residential block with different dwellers (356 dwellings and 18 spaces reserved for commercial activity). The positive implementation of energy efficiency measures motivated the dwellers to apply for installation of a microgeneration system, within the Micro-generation Framework for Renewables Energy Technologies adoption. 16 photovoltaic systems were installed, 3.68kWp each (288 panels), with an investment of 315.000 Euros from the dwellers (the biggest private and residential area for micro generation by PV panels in Portugal).

- Campo Pequeno residential tower

This newly refurbished building in the heart of Lisbon intends to be a high efficiency refurbishment work lodging luxury apartments. Among other concerns the promoter dealt with the national STO, that requires that new and refurbished residential buildings install 1qm of ST collectors per inhabitant, installing the ST system in the building's façade. From the total 58 collectors installed, 22 are installed in the South facade of the building and 26 in the West facade, highlighting the promoter's attitude towards energy efficiency. The hot water produced feeds the hot water need in the apartments and also the swimming pool and jacuzzin in the terrace.

4.4. Opportunities for improvements

Promote the integration of solar urban planning tools in urban development plans. Create and foster the use of solar optimization software that, similar to the energy performance simulations developed for buildings (eg. Energy Plus, etc) allow the simulation of new and renovated urban areas.

5. Further reading/information
