

# Thermal Comfort

What are the tools and barriers to undertaking a building Thermal Comfort analysis? How do we integrate into a project design?

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**Short Profile:** Tony Matar is Energy and Environment expert since 1992. He assisted through ALMEE in developing tens of Energy related projects and in preparing & editing more than 20 bulletins on Energy Saving, Renewable Energy, Energy Auditing, State of the Energy in Lebanon and others. He is a Founder member and technical advisor of the Lebanese Association of Energy Management and for Environment (ALMEE) -1992, and a Founder member of MEDENER (Mediterranean Association of the National Agencies for Energy Conservation).

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Definition / Benefits	Constraints / Challenges / Barriers
<ul style="list-style-type: none"><li>• Thermal comfort is directly related to weather, human activities, clothing, air temperature, radiant temperature, humidity, air velocity, etc...</li><li>• 2 types of measurement: PMV and Natural ventilation: interconnection? combination? benefits?</li><li>• At architectural level: design of TC into consideration?</li><li>• Temperature margin settings / thermostat</li><li>• Mixing valve PMV + Natural ventilation</li><li>• clothing is a main factor in thermal comfort</li></ul>	<ul style="list-style-type: none"><li>• Climatic zones: different perception and requirement</li><li>• To accommodate diversity</li><li>• Standards developed by LIBNOR are not mandatory</li><li>• R&amp;D for revised standards do not include energy consumption savings and management</li><li>• no forced ventilation</li><li>• surveys- no monitoring of laws</li><li>• no law enforcement</li><li>• revise laws: new technologies vs. new technologies such as LED lighting which do not</li></ul>

<ul style="list-style-type: none"> <li>• 4 or 5 climatic zones in Lebanon and each needs its standards for thermal comfort</li> </ul>	<p>diffuse heating</p> <ul style="list-style-type: none"> <li>• No awareness on temperature + humidity</li> </ul>
Best Practice / Solutions / Tools	Resources / Local Availability
<ul style="list-style-type: none"> <li>• Standards to become mandatory</li> <li>• Duplicate Masdar city in Qatar</li> <li>• Data analysis for climatic zones</li> <li>• energy consumption regulations/m2 like in Europe for permit</li> <li>• special glazing: reflective and low emissivity</li> <li>• energy consumption legislation for energy saving</li> <li>• advanced and mandatory legislations must be revised and adapted to Lebanon climatic zones and habits</li> <li>• softwares for engineers such as GRASS or ARZ</li> <li>• ratification of laws in parliament</li> <li>• Integrating Thermal Comfort into project design</li> <li>• The range of conditions acceptable at any one time is in the region of <math>\pm 2^{\circ}\text{C}</math>. Giving occupants the control necessary to make themselves comfortable can increase this range.</li> </ul>	<ul style="list-style-type: none"> <li>• passive cooling/heating</li> <li>• incentives for passive cooling and heating</li> <li>• incentives for special glazing</li> <li>• no forced ventilation</li> <li>• natural and mechanical ventilation in buildings</li> <li>• thermal insulation</li> <li>• BMS availability for small scale buildings</li> </ul>