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## Maslow's pyramid applied to energy efficiency in buildings

Every time you take on an energy efficiency project, your challenge is to find the best solutions based on your customer's objectives and budget. To make this easier, I have developed a dynamic, structured approach to help you in clearly establishing the customer's needs, while taking advantage of the many attractive grants.

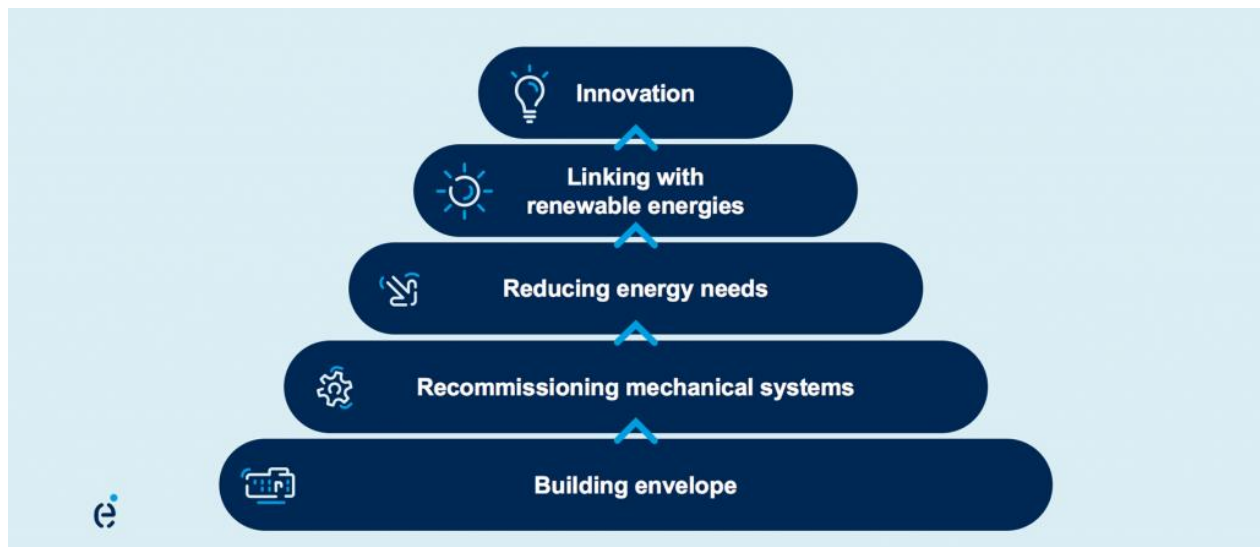
### A logical and holistic approach

I have called this approach the « Maslow energy efficiency pyramid. » As you no doubt know, the Maslow pyramid is a hierarchical representation of human needs, which shows that we can only get to the summit of the pyramid if our basic needs are satisfied. The same goes for energy efficiency: it would be illogical to embark on an energy innovation project in a building with poor insulation. [In other words, we don't start with the roof when building a house!]

The Maslow energy efficiency pyramid also helps envisage each project as a whole by putting the energy efficiency measures to be implemented in a logical order to arrive at the best possible result based on the customer's budget and timetable. As I like to say: *There's nothing worse than starting an innovation process without a vision and a master plan.*

## The five levels of the pyramid

Just like the « real » Maslow pyramid, our pyramid has five levels, which represent a gradual progression toward optimizing energy efficiency.



The pyramid

## The building envelope: the ABCs of energy efficiency

This is the base of our pyramid. Whether or not the customer plans to improve the thermal envelope of the building, this is essential to ensure energy losses are minimized and this work can easily be integrated into an energy efficiency project. We often hear, for example: « As long as we're changing the rooftop units, we might as well redo the roof. » But we can also think about insulating the walls or replacing the windows or other sealing work aimed at improving the building's R factor.

## Recommissioning of existing mechanical systems: a surprising potential

Unlike the adage: « If it ain't broke, don't fix it, » recommissioning is based on the principle of continuous improvement. In other words, even if the building seems to be functioning well, we need to identify systems that might not be performing optimally and correct any defects in order to improve the energy efficiency of the building while reducing costs and greenhouse gas emissions (GHGs).

How is recommissioning different from a conventional measure? Recommissioning does not involve purchasing new equipment. It might, for example, be sufficient for a technician to recalibrate the sequences. In just a week's work, a controls technician can generate enormous savings and this measure will have a positive effect on the payback period.

## Reducing energy needs: rationalize to consume better

Today there are many proven solutions for reducing a building's energy consumption. In some cases, it might be worthwhile doing an energy balance of the building to identify possible improvements – without necessarily resorting to a recommissioning. For example, think about a project to transform a water cooling tower system into a closed loop system aimed at recovering energy. While this type of measure does not fall into the category of a recommissioning, it does call for a substantial investment that needs to be the subject of a detailed study. Reducing energy needs can also involve purchasing new efficient equipment when the existing equipment cannot be optimized by recommissioning.

## Linking with renewable energies

### Solar energy

Contrary to what we might believe, Québec has significant solar potential since it is the radiation that makes the heat and not the temperature. Québec's annual average sunshine (total solar radiation) is higher than that of Germany and similar to that of Japan, both world leaders in solar energy.

To take advantage of this source of energy, there already are efficient solar thermal technologies that require little maintenance and that can lead to considerable savings.

The concept is simple: air or water is preheated in thermal collectors installed on the roof or façade of a building. In the case of air, it is warmed while circulating in the collectors before supplying a natural gas heating system, thereby reducing consumption. The principle is the same for water: water contained in a tank is warmed by a series of pipes filled with a heat transfer fluid before it is distributed throughout the building. In both cases, the degrees of heat gained are valuable: they help reduce the energy bill and GHGs.

### Renewable natural gas

[Renewable natural gas](#) (RNG) also offers potential savings and reduces GHGs that are particularly high. And, since RNG is perfectly interchangeable with conventional natural gas, customers who already use natural gas do not have to replace their equipment to take advantage of this renewable energy source.

Also, if each level of the energy efficiency pyramid has been completed successfully, then each cubic metre of RNG consumed has significant environmental benefits and may offer considerable economic advantages over other renewable energies.

## Innovation: unlimited possibilities

Innovation, the fifth and last level of our pyramid, is the culminating point of an energy efficiency approach. It consists of designing and developing an energy innovation with high potential for energy savings and for commercialization, like the ESA heat exchanger that is the subject [of this study](#). In some cases, it may simply mean exploiting an existing technology in a new way; while in other cases, the innovation will mean getting off the beaten track to think of energy from a new angle.

## Building on a solid foundation

When it comes to energy efficiency, we usually say that *the best energy is the one that we do not consume*. That is why the Maslow energy efficiency pyramid is a useful tool for your projects. By using it systematically, you are assured of minimizing, if not eliminating, energy losses at each stage and thus of building on a solid foundation.

### Grants that encourage implementing energy efficiency measures

For each level of the energy efficiency pyramid, Énergir offers grants that can help your customer make a decision – and shorten the payback period.

At each step, DATECH advisors are available to support and advise you in finding solutions best adapted to your projects.

Energy efficiency measure	Énergir grants
<b>Building envelope</b>	<a href="#">Grant of up to \$100,000 for efficient construction and renovation.*</a>
<b>Recommissioning mechanical systems</b>	<a href="#">Grant of up to \$100,000 for the recommissioning of existing mechanical systems.</a>
<b>Reducing energy needs</b>	<a href="#">Grants of up to \$25,000 for a feasibility study, and up to \$100,000 for the implementation of energy efficiency measures.</a>
<b>Linking with renewable energies</b>	<a href="#">Grant of up to \$200,000 for the purchase and installation of a solar pre-heating system for air or water.</a>
<b>Innovation</b>	<a href="#">Grants of up to \$25,000 for an experimental project and \$250,000 for a demonstration project.</a>

\* This grant under our Energy Efficiency Program has been simplified and is now based on a formula of \$/m<sup>2</sup> of surface replaced or renovated that achieves or exceeds a pre-established R factor.

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