Best Practices for Energy Efficiency

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Summary

Guidance to design and manage your make-a-thek space with energy saving, sustainability and low-impact habits in mind.

Makerspaces are places where ideas become objects. This transformation often requires electricity: machines, lighting, ventilation, heating, cooling, computers and other equipment all contribute to the energy footprint of the space.
Energy efficiency is therefore not only a technical issue. It is also connected to the sustainability of the project, the long-term use of machines, the cost of running the space, and the habits developed by the community.

This resource introduces **key principles to help libraries and make-a-thek teams design and manage their spaces with energy-saving in mind**. It does not provide a technical audit, but offers a **starting point to reflect on how space layout, machine use, maintenance and everyday behaviours can reduce unnecessary energy consumption.**

1. Why energy matters in a m-a-t space

In a make-a-thek, sustainability is not only about choosing recycled materials or circular activities. It also means paying attention to the energy required to run the space.

Machines such as 3D printers, laser cutters, heat presses, computers and ventilation systems can consume significant amounts of electricity. Some energy use is visible, but some is less obvious: machines left on standby, inefficient ventilation, unnecessary lighting, repeated heating and cooling cycles, or oversized machines used for small tasks.

Thinking about energy efficiency helps to:

- **reduce environmental impact;**
- **lower operating costs;**
- **extend the lifespan of tools and machines;**
- **support more responsible use of resources;**
- **make sustainability visible as part of the identity of the space.**

A useful principle is to reduce impact **at source**: consider energy use already during the design and planning phase, before a project is cut, printed, heated or produced.

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2. Designing the space for efficiency

Energy efficiency starts with the way the space is organized.

2.1 Observe energy use

A first step is to understand where energy is being used. Simple individual metering, for example using a plug-in energy meter, can help measure the consumption of specific machines and appliances.

This can make it easier to identify:

- machines that consume more than expected;
- equipment left on standby;
- “vampire” or hidden energy loads;
- opportunities to switch off, group activities or reorganize machine use.

2.2 Organize the layout carefully

A smart layout can reduce unnecessary energy use.

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For example:

- ☐ **place tactile and manual stations, such as sewing, weaving or hand-mending, where natural light is available;**
- ☐ **place heat-generating machines, such as 3D printers or laser cutters, in well-ventilated areas;**
- ☐ **avoid overloading spaces where ventilation or cooling needs to work hard;**
- ☐ **keep cable layouts simple and avoid unnecessary extension cords;**
- ☐ **organize machines so that related activities can be grouped and managed efficiently.**

The goal is not only to place machines where they fit, but to understand how their position affects lighting, ventilation, heat, comfort and use.

2.3 Use light and ventilation strategically

Lighting and ventilation are part of the energy design of the space.

Possible actions include:

- ☐ **making use of natural light for low-tech or manual activities;**
- ☐ **using LED lighting where artificial light is needed;**
- ☐ **avoiding unnecessary overhead lighting when a task area can be lit locally;**
- ☐ **using ventilation systems where they are required for safety and air quality;**
- ☐ **avoiding broad and inefficient heating, cooling or ventilation when a more targeted solution is possible.**

Ventilation remains essential for safety, especially with machines that produce fumes, dust or heat. Energy efficiency should never reduce the safety of users.

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3. Designing projects with energy in mind

Energy efficiency is also connected to how projects are designed.

3.1 Reduce waste before production

Before using a machine, users can be encouraged to think about how to reduce waste and unnecessary processing. For example:

- plan cuts carefully before laser cutting;
- use nesting strategies to reduce material waste;
- avoid unnecessary test pieces when a smaller test is enough;
- think about the full lifecycle of the object before making it;
- design only what is useful, repairable or meaningful.

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3.2 Use the right level of prototyping

Not every idea needs to start with a digital machine. In early stages, we can consider: paper or cardboard prototypes; partial prototypes; non-digital tools; small tests before full production. This can reduce both material waste and energy use.

3.3 Optimize digital fabrication

For 3D printing and similar processes, small design choices can reduce energy use. For example:

- avoid printing solid objects when infill patterns are enough;
- use partial prototyping to test only the uncertain parts of a design;
- divide large prototypes into smaller components when this reduces print time or support material;
- test designs virtually before cutting or printing, where simulation or digital preview is available.

The point is not to avoid digital fabrication, but to use it intentionally.

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4. Managing machines efficiently

Machine management has a direct impact on energy use.

4.1 Maintain machines regularly

Machines that are well maintained tend to work more efficiently and last longer. Good practice includes:

- following manufacturer guidelines;
- cleaning and checking equipment regularly;
- replacing worn parts when needed;
- ensuring machines are calibrated and functioning properly;
- avoiding unnecessary strain caused by poor maintenance.

4.2 Match the machine to the task

The size and type of machine should match the task. For example:

- use smaller desktop machines for small jobs where possible;
- avoid using large or industrial machines for minor tasks;
- choose the process that meets the required quality without unnecessary energy use;

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- use low-tech or manual tools when they are sufficient.

This helps users understand that the “most advanced” machine is not always the most appropriate one.

4.3 Group machine use when possible

Repeatedly heating, cooling, starting and stopping machines can waste energy.Where possible, the space can encourage grouped use, such as:

- batching 3D prints;
- grouping laser cutting jobs;
- organizing machine-based sessions at specific times;
- preparing files in advance before starting a machine;
- avoiding unnecessary machine idle time.

This can also help staff coordinate supervision and safety.

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5. Building sustainable habits in the community

Energy efficiency also depends on shared behaviours.

5.1 Make energy visible

Users are more likely to change habits if they understand the impact of their choices. A make-a-thek space can make energy use visible through:

- **posters, simple signs;**
- **examples of low-energy and high-energy processes;**
- **information about machine and material impact;**
- **explanations during workshops.**

This helps sustainability become part of the culture of the space.

5.2 Create power-down routines

Simple routines can prevent unnecessary energy waste. For example:

- ☐ switch off machines when not in use;
- ☐ avoid leaving equipment on standby;
- ☐ check lights, computers and tools at the end of the day;
- ☐ define who is responsible for closing procedures;
- ☐ create visible reminders near machines.

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These routines should be simple, repeatable and easy for staff and facilitators to follow.

5.3 Balance high-tech and low-tech activities

A sustainable make-a-thek does not need to rely only and always on powered machines. **Low-tech** and zero-electricity activities can be part of the programme, such as: hand-stitching, mending, natural dyeing, manual prototyping, repair conversations. This balance supports circularity while reducing the pressure to use machines for every activity.

Questions to ask before starting

Before setting up or running an activity, ask yourself:

- Are we using the right machine for the size and purpose of the task?
- Have we checked the energy and safety needs of the machine?
- Can we use natural light or local task lighting?
- Are machines switched off when not in use?
- Can we make energy use visible to participants?
- Can this activity include low-tech alternatives?

Takeaway

Energy efficiency in a make-a-thek is not only about reducing electricity use. It is about designing a space, a programme and a community culture that use machines with intention.

A sustainable makerspace asks:

Can we design the process better?
Can we reduce waste, time and unnecessary energy use?
Can low-tech and high-tech practices work together?

By combining smart layout, thoughtful machine management and shared habits, libraries can make energy efficiency part of everyday making.

What are your favorite energy-saving "hacks" in the workshop? Whether it’s a clever way to

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batch prints or a low-tech tool that replaces a power-hungry one, we want to hear from you!

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