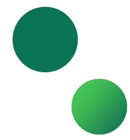
Making cell cultures more sustainable

Some general aspects and a concrete example for your research



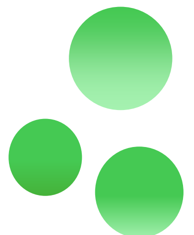
Approx. **49%** less energy

Up to **70%** Less waste per experiment

Note: Your experiment comes first. Do not impair the quality of your research! Go step by step and try out what works for you. You should think about controls and analyses to see whether your read-out will be affected – just like you do it in your research!

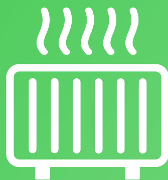
TAKE AWAY:

- Concrete actions & steps
- Include your peers for leverage
- Many opportunities exemplified



Addressing Equipment

You Can’t See Energy But You Can Reduce It



Save energy by only turning on the water bath when you know you will need it. Heat it up one hour beforehand instead of running your bath at all times. Consider getting a smart plug or plug timer for a few bucks. Secondly, if you feel comfortable, ask your colleagues when they will be working to coordinate.

The same applies to your hood.. Yes, initially, it might feel strange to close the sash even if you're only stepping away for 2 hours. However, it can make a significant difference! While it's difficult to estimate precisely, by reducing the airflow rate, you could save approximately 49% of energy. Rebooting modern hoods only requires a few minutes

Coordinate with others to determine who needs the hood and water bath at specific times. This is a fantastic opportunity to connect with new friends and supporters of the green movement, or even or to start a chat with your crush ♡

Splitting your cells

Something So Common but So Wasteful

The background

You know how it goes: you wash your cells, add enzyme to detach them, wash them, resuspend them, split/transfer them and add medium.

Note: your medium bottle is sacred. Make sure it stays sterile (contamination means wasting up to 500mL at once)

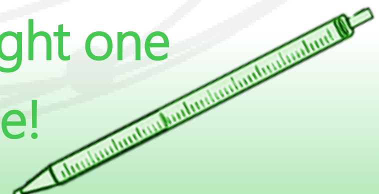
Pipettes, Pipetting´& Plastic

Distinguish between solutions that can be contaminated and those that cannot.

Establish dedicated stocks, as this eliminates the need to discard the serological pipette between various steps. When pipetting, touch the liquid only with the very tip, then slowly and completely draw up the fluid. Furthermore, when you only need to add 1 mL of liquid, think about using a regular pipette tip instead of a serological pipette. This simple switch can reduce plastic usage by up to 82%.

To illustrate: if you maintain a separate PBS and Medium tubes, you can keep the same pipette for washing, enzyme pipetting, and adding medium. Of course, if you treat multiple cell lines, you might think about working in parallel on as many as you can handle (without rushing)!

When choosing the right one 82% less plastic waste!



Within your experiment

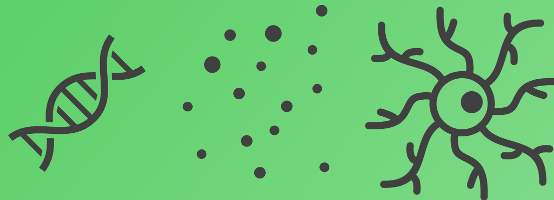
Taking a New Angle

The approach

The key is to examine your experiment from a different perspective. Each protocol is different, therefore, has to be optimized individually. Don't be discouraged; once these steps are recognized, they often appear trivial and self-evident. Moreover, if you're unable to implement every improvement in your protocol, don't be disheartened. Progress one step at a time!

Digging deeper

We use the example of transfecting neurons (which is transferring foreign DNA into the nerve cells from our brain) because we want to show that you can work sustainably even when working with these sensitive cells.



Summed up over the entire experiment we reduced waste by **71%.** That is **67g** per experiment. Since we might have run up to one of them per weak and per researcher that is essentially **19,2kg** of plastic less per year in a middle sized lab.

Finally, make sure to be wary of what you do. We controlled cell viability, morphology and did not see any changes in the experiments we have used these cells for. Think about what you can look for to check whether everything is running smooty.

Caution – a lot of TEXT

Do You Find the Special Word?

Generalize it!

We discuss a specific experiment to illustrate our point. Nevertheless, these very same principles are applicable whether you're engaged in chemical synthesis, drug testing, or cultivating chloroplasts in a microdevice.

Example: neuronal transfections

Consider if you can combine two chemicals or solutions in a single tube, if they're both destined for the same cells later on. For instance, in our scenario, you can blend buffer (HBSS) and medium (NBG) rather than diluting each separately and sequentially adding them to your cells.

Additionally, use smaller or lighter equipment. This means opting for a 1 mL pipette tip instead of a serological pipette. Similarly, use smaller dishes. Making a switch from a 15 mL tube to a 1.5 mL tube results in an **83% reduction** in plastic consumption. In our case, we substituted 1.5 mL tubes with PCR tubes for DNA preparation.

Rethink the sequence of your pipetting scheme. Instead of resuspending and plating cells using a 25 mL pipette, followed by adding a chemical with a 10 mL serological pipette, start by mixing the chemical and cells, and then proceed to plate them. This approach enables you to use just one 25 mL pipette. While seemingly straightforward, this step often goes overlooked, with researchers inheriting protocols designed for larger volumes or not having access to smaller dishes at the time.

This is when you realize there is no special word :D

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