

Checklist for a More Sustainable Lab



The following list provides ideas how resources may be saved in the lab. Please check upfront (before taking action) with your local biosafety officer as well as with your local sustainability officer which action points can be used in your lab. Some processes and sample types require specific conditions which must not be changed due to safety reasons.

Energy

▶ Proposals	Not changeable	To be discussed	Change needed	Solved
> Shut the sash of biosafety cabinets and chemical hoods (put sticker with reminder on the sash)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Avoid stand-by of instruments but turn them off	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use clock timers for smaller instruments				
> Close the lid of your refrigerated centrifuges if they are at 4 °C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Open your freezer as shortly as possible				
> Avoid running your PCR overnight – and if you have to, put it on hold at >12 °C instead of +4 °C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Set your freezers to -70 °C instead of -80 °C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Turn off the lights in the evening before you leave	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Know and stick to the heating and cooling times of your devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Know your operations time and run your instruments only as long as you need them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Only autoclave items which need to be sterile, other items can run through the dishwasher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Fill autoclave and dishwasher to max. loading, avoid 25%-loading runs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Replace ice machines by cooling blocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Water

▶ Proposals	Not changeable	To be discussed	Change needed	Solved
> Run devices like autoclaves or washing machines only fully loaded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Check your instruments' program – apply the resource-efficient mode and check out if there's an eco-friendly mode	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Check tubes for leakages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Avoid single-pass cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> When you're working in chemistry than check if you could switch to air cooling rather than water cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Replace ice by other cooling devices like cooling blocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Metal beads can be a good alternative to water baths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Cover up your water bath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Check the water quality & choose lowest water grade acceptable for the specific task	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Autoclaves should always be closed except for loading and unloading – avoid additional heat load resp. steam load to your ventilation system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

▶ Your notes



Reagents & Chemicals

▶ Proposals	Not changeable	To be discussed	Change needed	Solved
> Check for alternatives for toxic or hazardous products, e.g. β -Mercaptoethanol can be replaced by the less toxic dithiothreitol (DTT) in RNA extractions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Do not store reagents or chemicals in the fume hood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Order oligos or antibodies in dry condition - saves resources for cooling and packaging material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Give surplus chemicals or reagents which you do not need any more to a lab that needs it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use biobased solvents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Only order what you really need	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use an inventory system to be up to date & to not to miss an expiry date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use non-toxic alternatives for ethidiumbromide like GelRed® or SYBR® Green	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Look out for recombinant proteins or enzymes like recombinant BSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Choose FCS-free media whenever possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

▶ Your notes



Consumables

► Proposals	Not changeable	To be discussed	Change needed	Solved
> Use the appropriate size of your tubes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Reuse tubes and other devices whenever reasonable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Replace plastic by other material like glass or metal, e.g. inoculation loops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Reconsider if you really need a sterile device (pipette, tube, ...) for your current experiment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Minimize e.g., by reducing the diameter of your petri dishes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use appropriate, sized vessels to store your samples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use mastermixes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Choose refills – cost less and use less packaging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Look out for labels, like ACT or ENERGY STAR®	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Minimize your methods e.g., a dilution series can be also performed in 96-well plates instead of tubes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

► Your notes



Waste

▶ Proposals	Not changeable	To be discussed	Change needed	Solved
> Separate your non-contaminated waste like packaging (paper, plastics,..) and put it into the designated waste bin so that it could be recycled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Follow your local recycling scheme – contact your waste management if you are unsure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Substitute hazardous chemicals by non-hazardous variants wherever possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use recycling programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use bio-based solvents, e.g. bio-based ethanol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use take-back programs e.g. for cooling packs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use refill systems e.g. for pipette tips or solvent containers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Reduce waste by minimizing your experimental design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Change to reusable items wherever possible to avoid single-use waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use charcoal to bind and reduce your ethidiumbromide waste quantity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

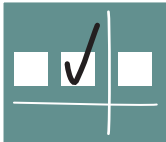
▶ Your notes



Methods & Experiments

▶ Proposals	Not changeable	To be discussed	Change needed	Solved
> Use keywords to search for methods and experiments like sustainable, resource efficient, green chemistry, green analytical chemistry, energy efficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Miniaturize your methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Apply the principles of green chemistry & green analytical chemistry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Choose green, non-toxic solvents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> DNA and RNA does not always have to be stored @ -80°C, especially for short storage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Use alternative methods for DNA storage like room temperature storage methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Plan your experiments ahead: think where you can reduce the scale of your experiment and the amount of material and reagents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Be aware: an unplanned repetition of your experiment means that you're wasting resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Choose the newest software version when doing a digital analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Share experimental approaches and methods that did not work – this prevents others from wasting time and resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

▶ Your notes



Organisation & Routines

Proposals	Not changeable	To be discussed	Change needed	Solved
> Share your instruments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Merge your orders to save transport ways and emissions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Establish an inventory management for your samples, reagents, chemicals & consumables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Check before buying a new kit, chemical or reagent if it is already available in your lab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Reach out to other labs if you could establish a sharing system for reagents and chemicals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Establish a first in/first out routine for chemicals and reagents to avoid expired items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Get organized in your freezer: rack systems need less space than bags or single boxes in different sizes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Declutter and defrost your freezers regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Establish a labs departure checklist for everyone who exits the lab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
> Establish a sustainable procurement: look out for environmentally conscious suppliers and product labels like ACT, ENERGY STAR®, or EGNATON CERT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

▶ Your notes

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