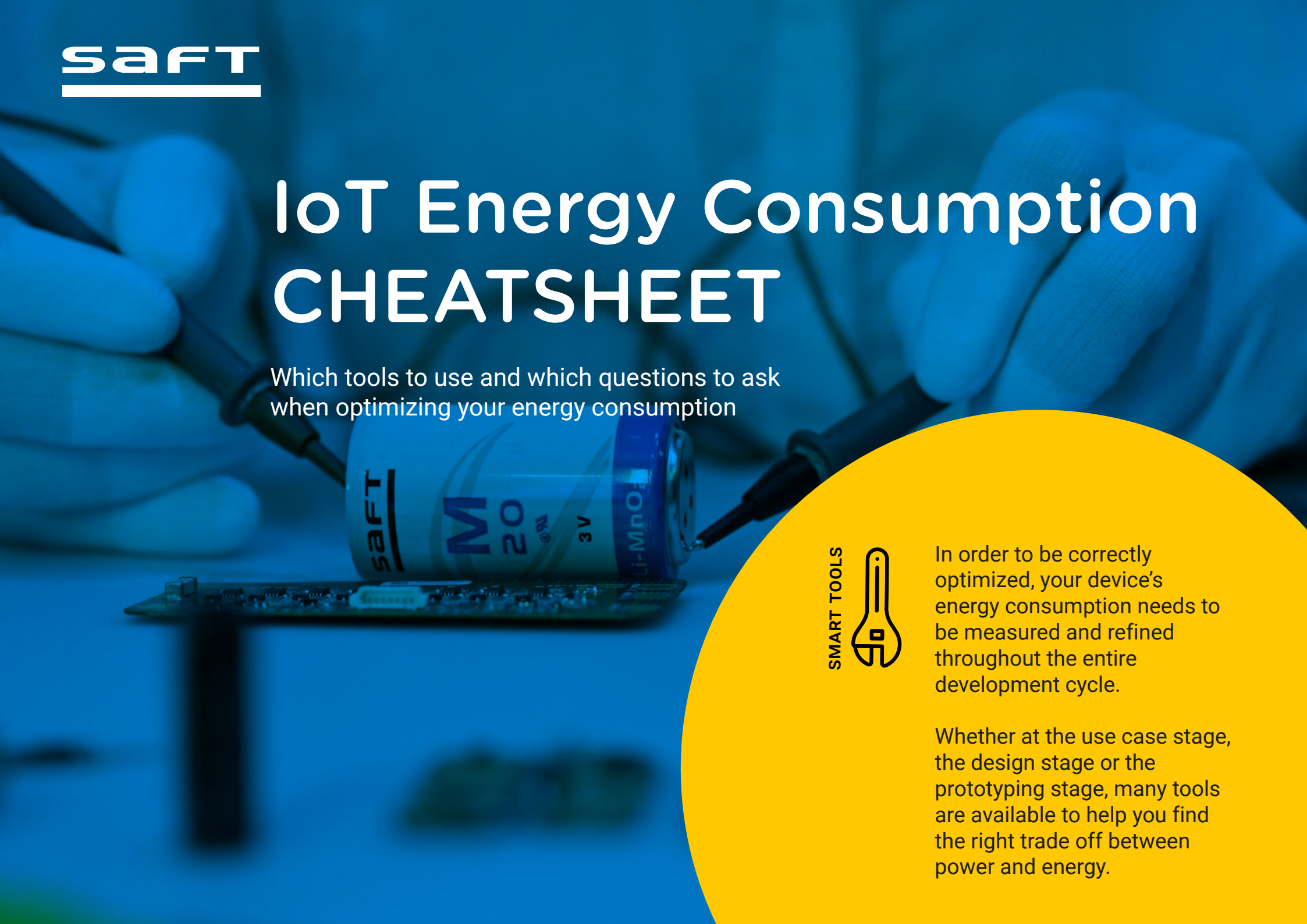
# IoT Energy Consumption CHEATSHEET

Which tools to use and which questions to ask when optimizing your energy consumption




## SMART TOOLS

In order to be correctly optimized, your device's energy consumption needs to be measured and refined throughout the entire development cycle.

Whether at the use case stage, the design stage or the prototyping stage, many tools are available to help you find the right trade off between power and energy.

# 1 Defining Your Use Case

Optimizing your energy consumption is not just about buying the battery featuring the highest capacity. You have to choose the right one for your use case, one that's going to offer the best capacity, not just on paper but in the field under real world conditions.

At such an early stage, you won't be able to perform measurements since the electronics are not yet defined. You'll therefore need to start with a few assumptions and some calculations.

## What Do You Need to Look into at This Stage?

1. The connectivity solution you are going to adopt (some connectivity solutions are more power hungry than others).
2. The number of times per day you will need to transmit your data (the more frequent the communication, the higher the energy needed).
3. The deployment location of your application. Is it indoors or outdoors? In Siberia or Africa? (Extreme temperatures at each end of the scale can have a marked impact on the consumption).
4. The autonomy needed for your use case.

MORE RESOURCES:

- How can primary batteries achieve their expected lifetime?
- The impact of the communication protocol on your IoT consumption
- About Saft's Smart Battery Selector

SMART TOOLS

**Saft IoT Smart Selector (free)**
https://saft4u.saftbatteries.com/en/iot/simulator

Find the best possible arrangements to extend your device's lifetime whilst providing the power needed to match its usage, at a very early stage of your project.
In 7 questions, narrow down your battery options and enhance your device's power requirements.

## WHAT INFLUENCES THE BATTERY LONGEVITY OF AN IOT APPLICATION?

# 2 Designing Your Device

The choice of hardware and software to be used in your device will strongly impact the battery lifetime. Several modeling tools can help you get a mathematical proof of the battery life whilst helping you to optimize its design.

**Saft has partnered with 2 key players to offer you free online simulation tools.**

## Online Simulation Tools

SMART TOOLS

### Wisebatt for Saft (free)

https://saft.wisebatt.com

Build a realistic virtual prototype of your device that can be directly applied in the selection and the characterization of your device's architecture. The tool simulates the battery life, according to the device's hardware parameters, and also takes into account environmental parameters that will affect the rate of discharge. This helps the simulation to be as accurate as possible.
You can then experiment —very early in the design cycle— with several parameters in order to make the optimal choice between cost, battery life and performance.

### Deutsche Telekom IoT Solution Optimizer

https://iot.telekom.com/en/solutions/iot-solution-optimizer

Model and optimize the performance of your battery-powered IoT applications. Specify the deployment markets and the access technology of choice, configure your hardware and software, and define the communication and power efficiency profiles of the application. From there, you can model reliable results of expected battery life and see how its performance can be optimized.

## What Do You Need to Look into at This Stage?

1. Your consumption profile that is influenced by the choice of hardware, firmware and software. Systematically test each one of them and don't forget to implement power saving features!
2. The cut-off voltage of the electronics. Generally, when the voltage is higher, the battery's electronic efficiency is better. Reducing a device's operational voltage will enhance current consumption for the battery.

MORE RESOURCES

**How to create a successful ecosystem for your IoT project**

- ↳ Improving the overall efficiency and cost of your IoT device thanks to Virtual prototyping and testing.
- ↳ Optimizing your energy consumption
- ↳ Deutsche Telekom's ecosystem for IoT developers

**About Wisebatt for Saft**

- ↳ Wisebatt for Saft is now live! Why should you use it?
- ↳ Wisebatt for Saft - How does it work?

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# 3 Prototyping and Testing

Now that your electronics are optimized, let's gravitate to the real world and test, test, test!

You'll need to measure the real power consumption of your device while in use (hardware AND software). For that, you'll have to use a smart power supply that not only supplies energy to the device, but also has the ability to measure the voltage and current that is being supplied.

SMART TOOLS

## Smart Power Supply

**Qoitech OTII solution**
https://www.qoitech.com

A portable power supply that also acts as a current and voltage measurement unit. A visualization tool interfaces to the Otii Arc to perform current and voltage measurements and control the power supply's behavior. The visualization is used to analyze energy consumption and determine where and how to optimize the system.

## What Do You Need to Look into at This Stage?

1. Make sure to use representative test conditions to ensure that your battery lifetime assessment is accurate.
2. Are there any major hardware blocks in the design? Any inefficient components that leak current?
3. Don't forget to test the antenna and it's position in the field.
4. Are all your major system components equipped with a sleep mode or low power state?

Another tried and tested way to optimize your power consumption is to speak to your battery manufacturer! They know their products for the IoT inside out and can point out the sources of poossile inefficiencies. They'll be able to help you!

MORE RESOURCES

**Joint workshop Qoitech /Saft at The Things Conference 2020:**

↳ How to select the right power source for your lora node in 3-steps

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# A Step by Step Guide

**Get in Touch!**
energizeiot@saftbatteries.com

## CHOOSING A BATTERY FOR YOUR IOT SOLUTION

### 01. DEFINE USE CASE
+++
- Connectivity solution
- Time frequency of data transmission
- Lifetime expectation
- Environment conditions
- End market certifications v

SAFT SMART BATTERY SELECTOR

BATTERIES' DATASHEETS

### 02. DESIGN
+++
- Consumption profile
- Technical choices
- Components selection

WISEBATT

DEUTSCHE TELEKOM SOLUTION OPTIMIZER

COMPONENTS MANUFACTURERS

### 03. PROTOTYPE & TEST
+++
- Representative test conditions
- Battery lifetime assessment

BATTERY MANUFACTURERS

LIFETIME MODEL

OTII BY QOITECH

OPTIMIZE

### 04. INDUSTRIALIZE
+++
- Battery integration
- Safety
- Reliability
- ROI validation
- Production volumes

EMS

BATTERY MANUFACTURERS

### 05. DEPLOY & INSTALL
+++
- Transport
- Logistics (storage)
- Replacement