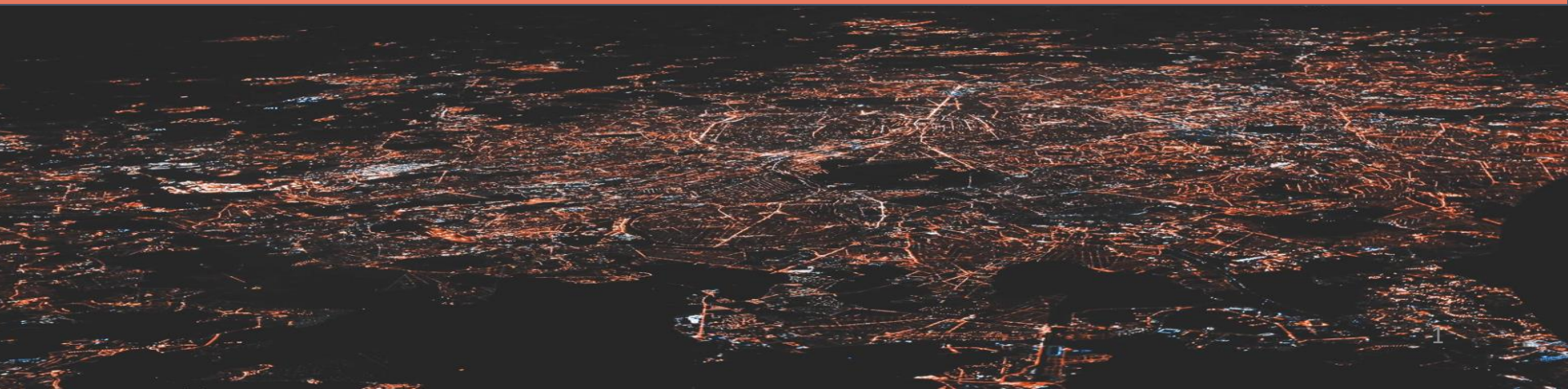




## Simple solution for digital monitoring of complex industrial processes

Lab-driven DeepTech | Born in Grenoble Alpes (CNRS) | Incorporated in 2020 | Impact Investing | 1st seed round



## Dimitri TAÏNOFF – CEO



### EDUCATION :

- . PhD in physics (Univ Lyon 1)
- . Entrepreneurial courses at HEC

### EXPERIENCE :

- . Engineer/researcher/assistant professor at CEA, CNRS and UGA
- . Expert in thermal energy harvesting
- . Valorization of patents first in the laboratory and then in the start-up



### ROLE IN THE START-UP

- . HR team management
- . Administrative management
- . Funding
- . Segmentation and marketing
- . Customer contact before/during sales
- . Communication
- . Management and construction of low TRL scientific projects

## Hervé DESLANDES – CTO



### EDUCATION :

- . Electronic / computer engineer
- . PhD in instrumentation (Paris VI)

### EXPERIENCE :

- . System engineer
- . WW Applications Manager
  - Before / after sales
  - Project management
- . Product manager (US government)
- . Patents, conferences



### ROLE IN THE START-UP

- . Technical team management
- . Project management
- . Purchasing
- . Industrialization
- . Quality / Prototype testing
- . Customer contact during/after sales.

## Dimitri TAÏNOFF – CEO - cofounder



- . HR team management
- . Administrative management
- . Funding
- . Segmentation and marketing
- . Sales
- . Communication



## Hervé Deslandes – CTO



- . Technical team management
- . Project management
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## UNE EQUIPE TECHNIQUE COMPLEMENTAIRE

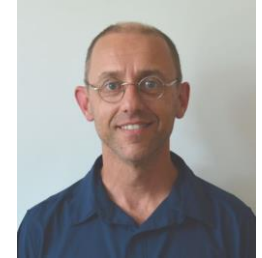
A. Proudhom  
Engineer since  
2017 :  
Design and test of  
prototypes



F. Chambettaz  
PhD  
CNRS, CEA & ST  
Design and test of  
nanoTEG



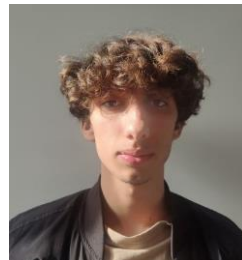
N. Chessel  
Clean room  
R&D @ ST  
Elaboration of  
nanoTEG



**Olivier BOURGEOIS**  
Conseil scientifique

- Cofounder
- Transfert of nanoTEG
- Common Lab
- R&D project

N. Lopez  
Electronics :  
Design and  
test of  
electronic



L. Lefèvre  
Half time  
Measurement

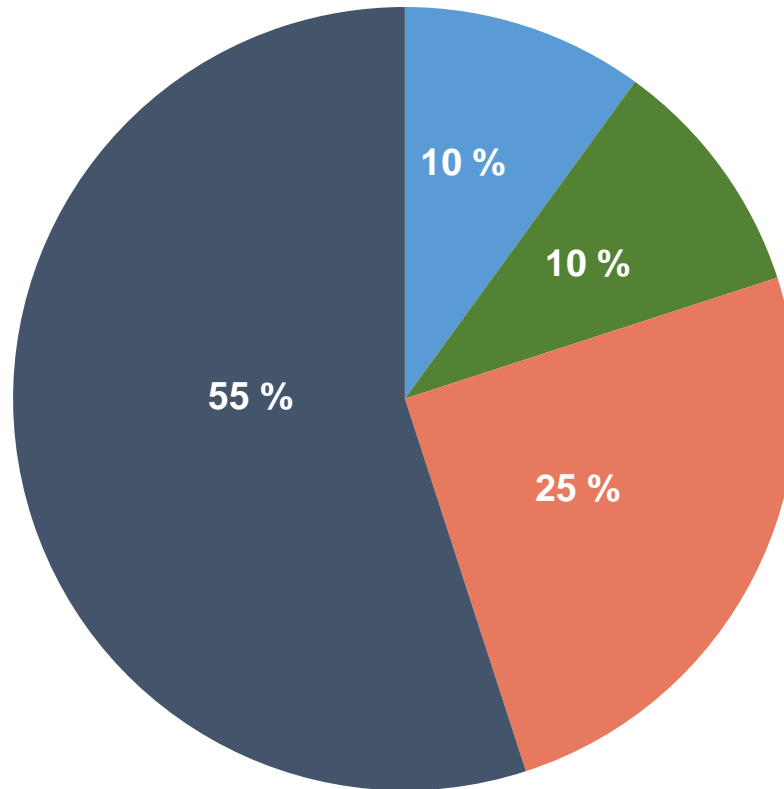


B. You  
Half tim  
Electronic



# Shareholding

shareholding



■ Olivier Bourgeois ■ SATT Linksium  
■ Hervé Deslandes ■ Dimitri Tainoff





The power that is needed to make that aluminium smelter work is half the production of a nuclear reactor





## Context : complex industrial processes



Digitalization

**Increase the profit margins of 10 to 30 points\*\*.**

\* Werner Struth, member of Bosch board (2012 – 2017)

\*\* <https://www.mckinsey.com/capabilities/operations/our-insights/mapping-heavy-industrys-digital-manufacturing-opportunities>

## Context : complex industrial processes



Valuable  
Data

Digitalization

**Increase the profit margins  
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**Data are key raw materials for Industry 4.0 \***

\* Werner Struth, member of Bosch board (2012 – 2017)

\*\* <https://www.mckinsey.com/capabilities/operations/our-insights/mapping-heavy-industrys-digital-manufacturing-opportunities>



## Context : complex industrial processes



Sensors

Valuable  
Data

Digitalization

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## Sensors are the mining tools of Industry 4.0

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## Context : complex industrial processes



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# Issue : powering of sensors

## DATA TRANSMISSION RATE

DATA TRANSMISSION MEAN

	Day	Hour	Minute	Second
<b>WIRED TRANSMISSION</b> 4 - 20 mA ...   <b>sensors</b>				



**WIRING : \$\$**  
**RETROFIT : \$\$\$\$\$**  
**3–20 k€/sensors**



# Issue : powering of sensors

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<b>RADIO TRANSMISSION</b> LoRA, 5G, BLE ....	
---	---

**250 €/sensors + maintenance**  
**cost OK if battery lifetime >**  
**one year**

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Increase of data rate →  
decrease of battery lifetime.

**WIRING : \$\$**  
**RETROFIT : \$\$\$\$\$**  
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250 €/sensors + maintenance  
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Lifetime of 3 months → 4 k€ +  
40 batteries /sensor for 10 years

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<b>RADIO TRANSMISSION</b> LoRA, 5G, BLE ....  
--

  
**NO SUITABLE  
ENERGY SOURCE**

**WIRING : \$\$**  
**RETROFIT : \$\$\$\$\$**  
**3–20 k€/sensors**

**250 €/sensors + maintenance  
cost OK if battery lifetime >  
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**Lifetime of 3 months → 4 k€ +  
40 batteries /sensor for 10 years**





# 33%

---

33% of energy used in French industry is lost under the form of heat, vapor or smokes (les échos – 2022)

---

Energy is very expensive but in **industrial environments**  
**Heat is everywhere and heat is free !**

## Solution : harvesting of fatal heat

The start-up MOiZ uses fatal heat to power a stand-alone digital monitoring system that optimizes process operation simply, without wires nor batteries



01

– **Economic benefit:** better process monitoring with less operating losses with a ROI-customer oriented sensor.

02

– **User benefit:** without batteries nor wires, our autonomous measurement modules are easy to install and require no maintenance, for at least 10 years !



03

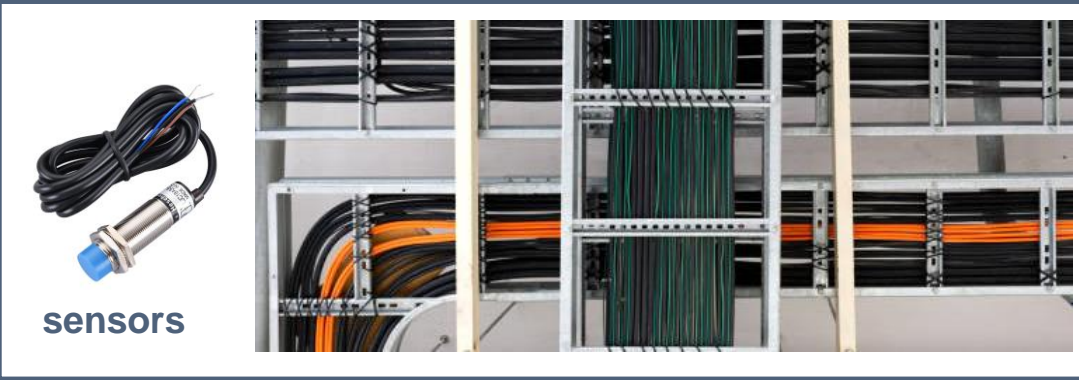
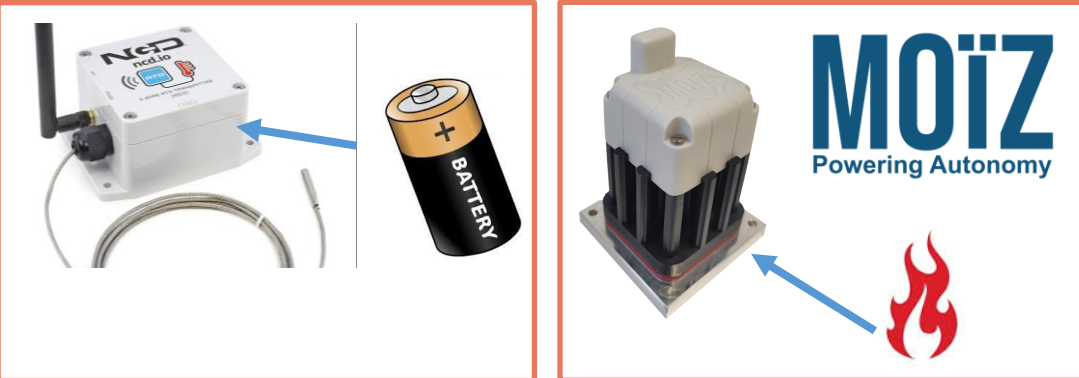
– **Double ecological benefit:** both the reduction of operating losses through resource optimization and the harvesting of energy that is currently lost.



# Positionning of MOiZ

## DATA TRANSMISSION RATE

### DATA TRANSMISSION MEAN

	Day	Hour	Minute	Second
WIRED TRANSMISSION 4 - 20 mA ...				
RADIO TRANSMISSION LoRA, 5G, BLE ....				

The start-up MOiZ offers monitoring solutions that cannot be performed with wired or battery-powered sensors

The start-up MOiZ sells this solution as a product or as a license on co-developed products for very specific applications



## A FULLY AUTONOMOUS MODULE

No wires  
No batteries

## TRL LEVEL OF 7

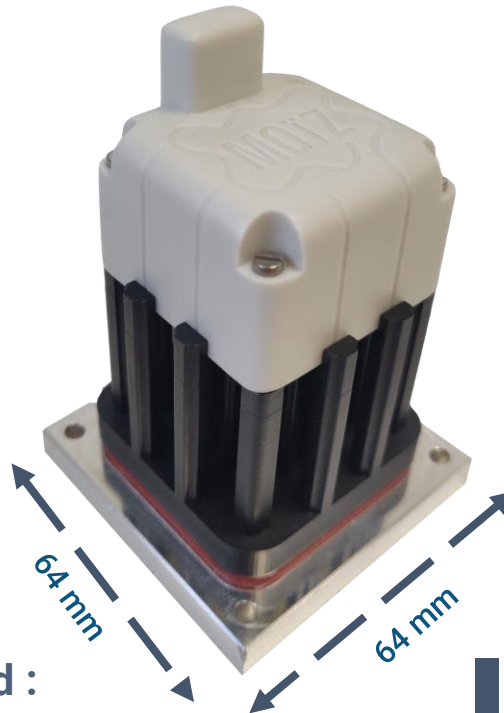
Pre-industrialization  
is ending

# Harvestree

## A LARGE RANGE OF SENSORS

I<sup>2</sup>C and analog port → a large number of sensor has been used :

- ☑ Temperature including IR
- ☑ Pressure
- ☑ Weather
- ☑ Vibration
- ☑ Customer choice ....



## INNOVATIVE ARCHITECTURE

Patent delivered in EU

Highly efficient design : 10°C  
of temperature difference is  
converted in 1 measure/5 min.

## Use case #1



**RioTinto**

### Monitoring of aluminum process

Heat source : Electrolysis potshell

Cold source : ambient air

Sensor : two deported temperature sensors



(50 sensors deployed)

# HARVESTREE : other use cases



## Monitoring of an urban heating factory

Heat source : boiler

Cold source : ambient air

Sensor : temperature



## Monitoring HV bus bar temperature

Hot source : casing of HV bus bar

Cold source : ambient air

Sensor : IR temperature sensor



## Codevelopment with

### Temperature measurement of the catenary under voltage

Hot source : black part that absorb solar heat

Cold source : ambient air

Sensor : temperature

But also:



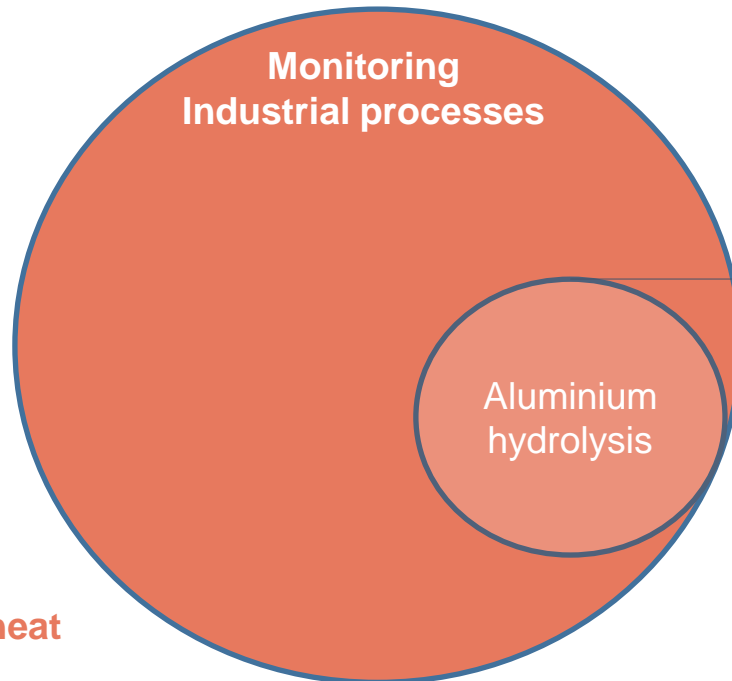


# Our commercial pipeline



## Go to market / market strategy

Daily Heat



### Go to market with Harvestree

2023 TAM in value (ww) : 350 M€  
Main players are RIO TINTO, ALCOA, RUSAL,

# Vertical market : aluminium electrolysis (1/3)

**RioTinto**

## Some key figures:

One pot (360 kA) → 1000 t of aluminum per year  
The global efficiency of the process ~ 50 % thermal losses  
1% less yield / year ~ 35 k€ per pot per year  
1 ton of aluminum 13,5MWh  
Electricity ~ about 30% of production costs in France

## What should be done :

Monitoring the air leak of the tank: operational problem in the maintenance of thermal loss  
Monitoring the temperature of the pot : potshell at the end of its life : safety problem for the plant VS extension of its lifetime

## But .... :

Wiring of sensors impossible in productionLifetime of the batteries about 4 months in the framework of the realization of a monitoring.



**RioTinto**

- There are about 65,000 aluminium pots in the world
- Market is dominated by 6 players → Rio Tinto equips 10,000 pots with its Alpsys process
- Rio Tinto Aluminium Pechiney sells a process to a customer who is not necessarily Rio Tinto.
- MOÏZ sensors would be distributed by RTAP within this industrial distributor offer





**RioTinto**



## Some key figures :

Cost of 10 MOÏZ sensors for monitoring a potshell + supports etc... 5 k€

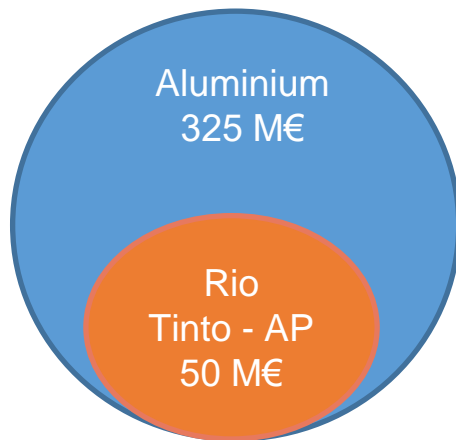
1 plant includes between 200 and 600 tanks

Equipment of a plant : between 1 and 3 M€.

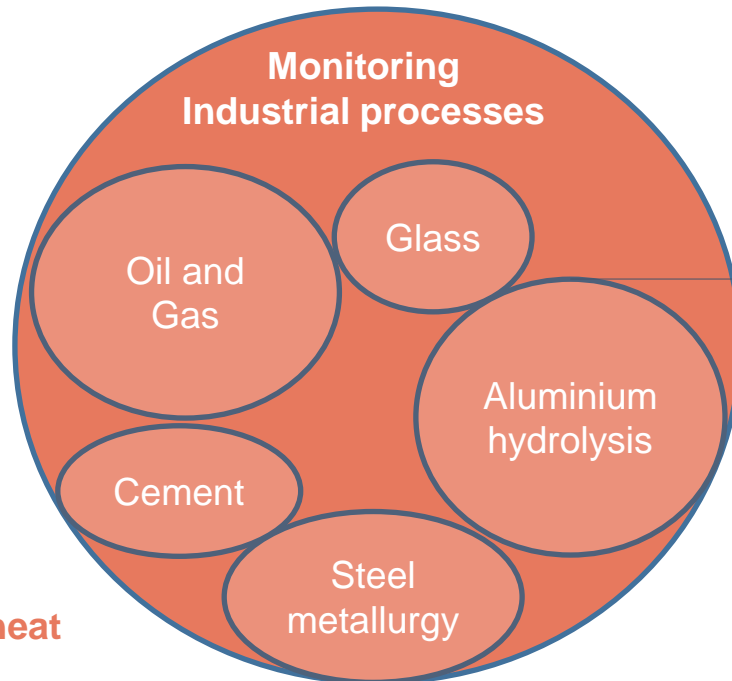
Vertical aluminium electrolysis for MOÏZ : 325 M€.

Accessible share with RioTinto : 50 M€

Partnership contract under negotiation with RTAP



Daily Heat



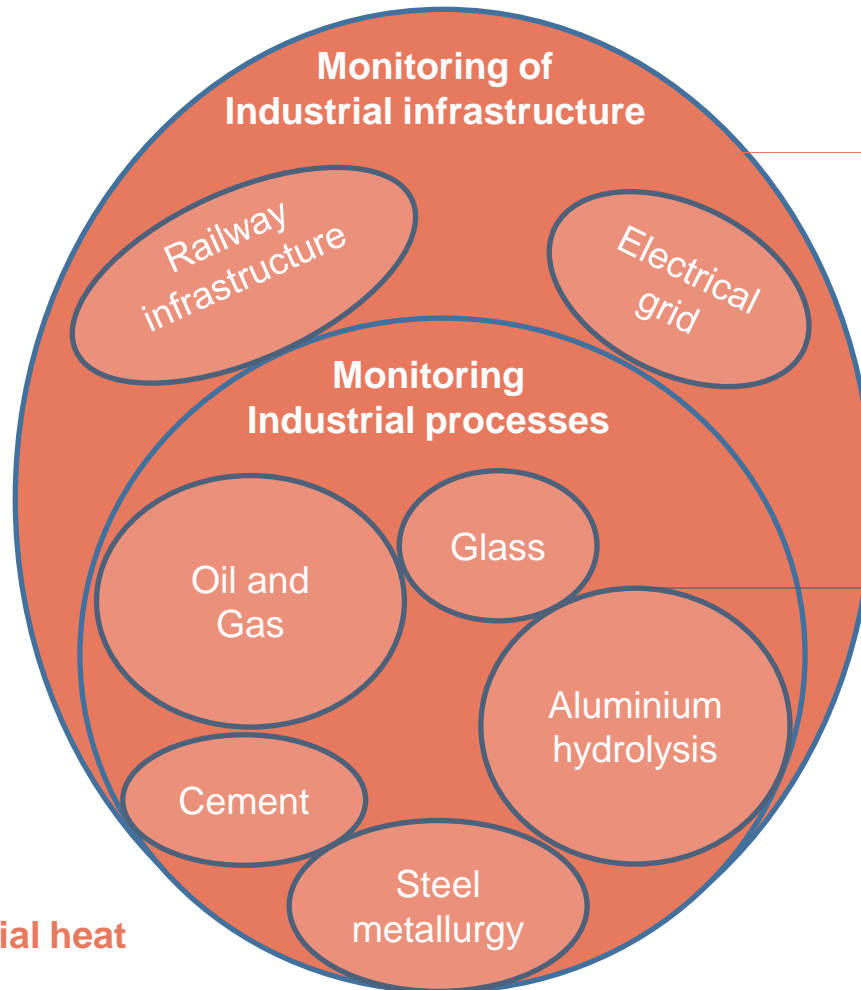
## Go to market with Harvestree

2023 TAM in value (ww) : 350 M€  
Main players are RIO TINTO, ALCOA, RUSAL,

Addressing other vertical  
markets where heat is abundant

# Go to market / market strategy

Daily Heat



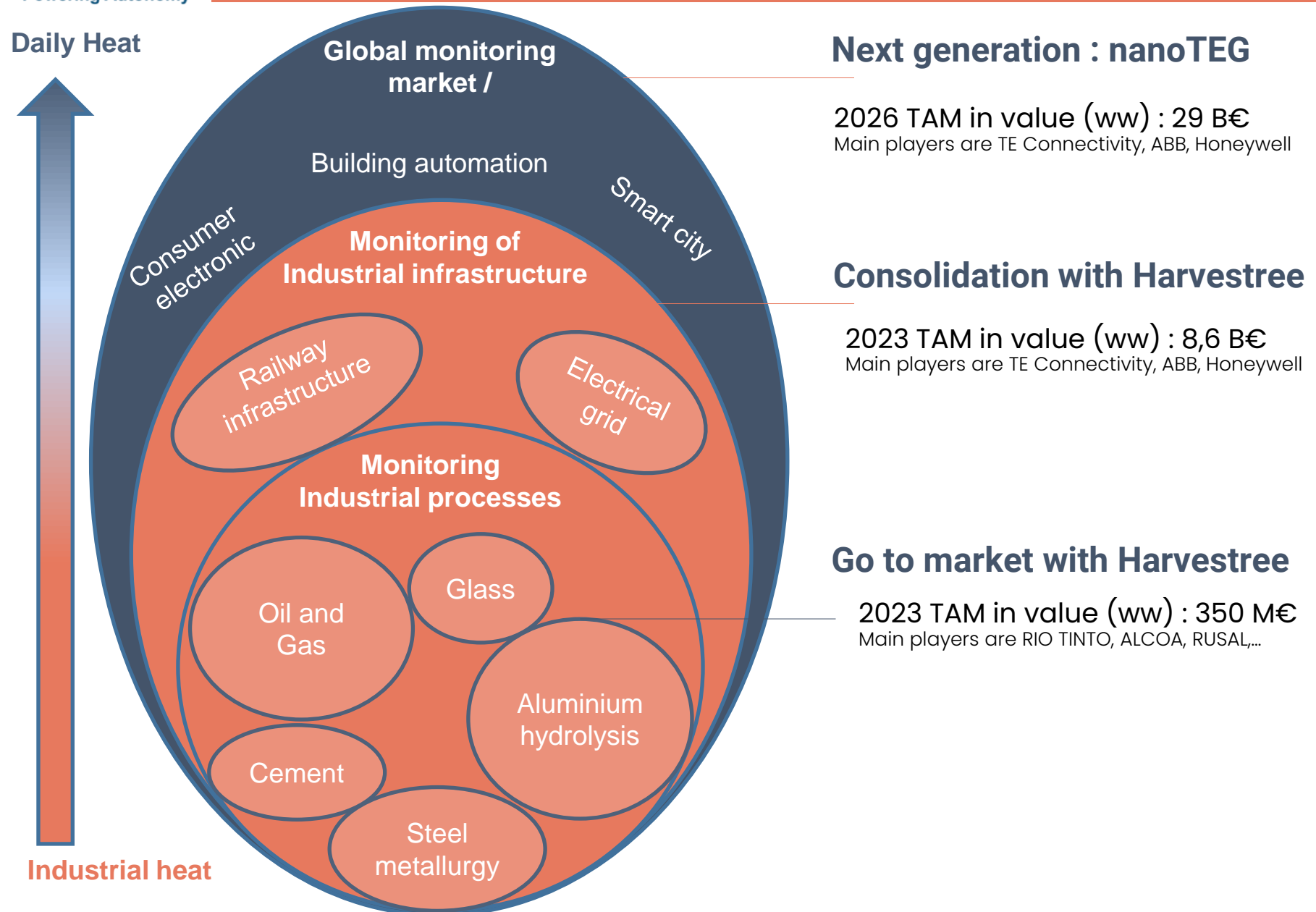
## Consolidation with Harvestree

2023 TAM in value (ww) : 8,6 B€  
Main players are TE Connectivity, ABB, Honeywell

## Go to market with Harvestree

2023 TAM in value (ww) : 350 M€  
Main players are RIO TINTO, ALCOA, RUSAL,

# Go to market / market strategy

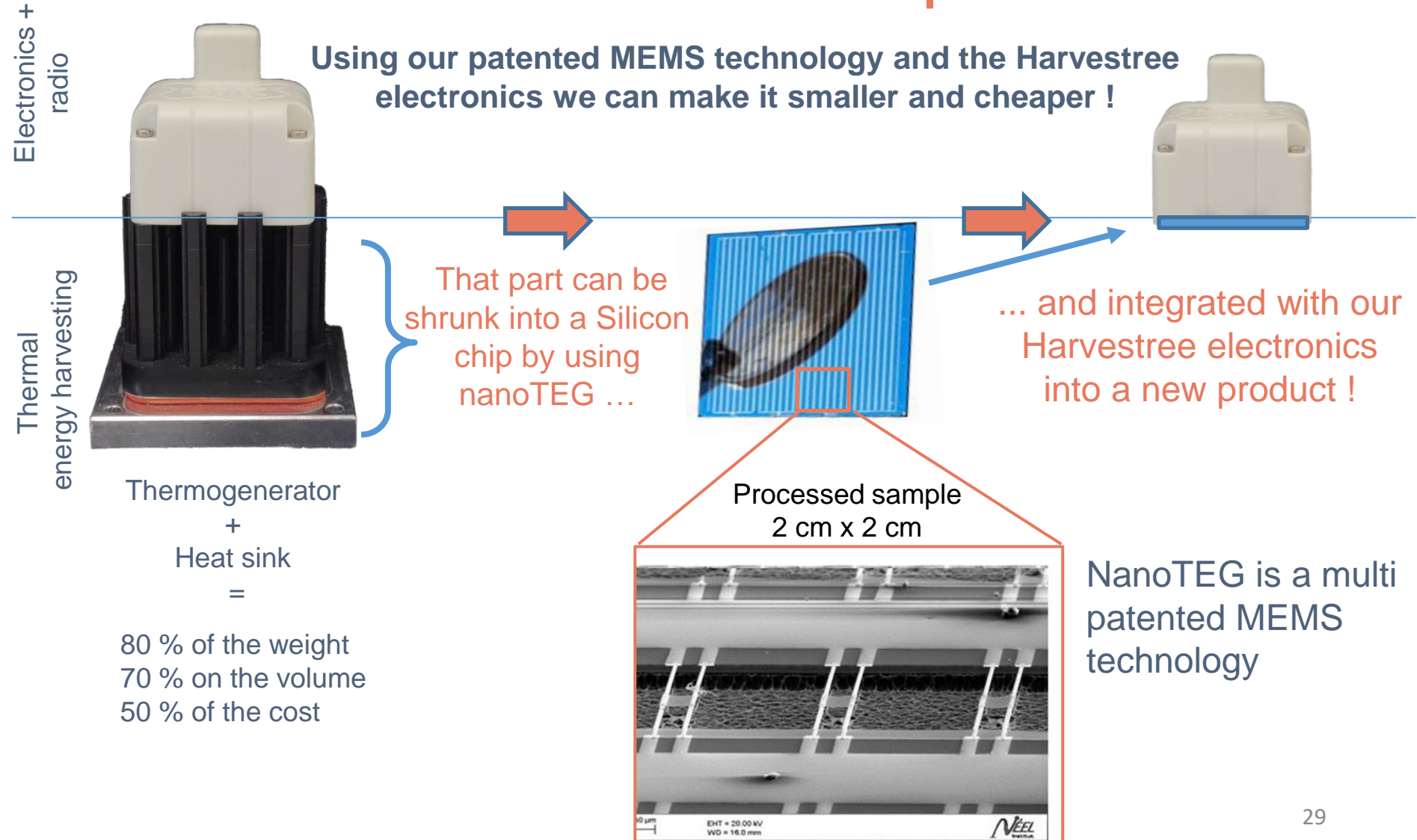




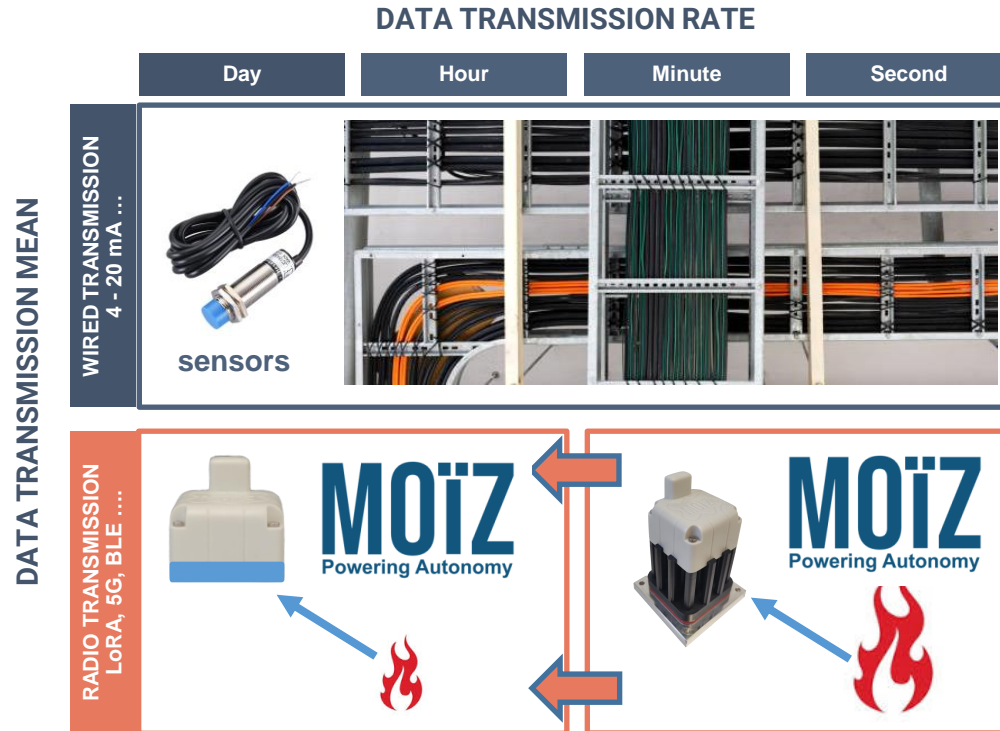
# Disruptive technology : nanoTEG ( 1/2)

## NanoTEGs in R&D phase

Using our patented MEMS technology and the Harvestree electronics we can make it smaller and cheaper !



# Disruptive technology : nanoTEG ( 2/2)



This new autonomous sensor will be :

- Smaller
- Cheaper
- Suited to daily heat applications : home and building automation, smart city ....

The nanoTEG technology can also be licensed to address other markets.



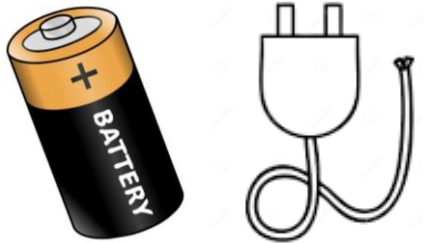
## Business model:

### 1) Fabless manufacturing of Harvestree with an industrial partner

- Not a huge added value to internalize the manufacturing
- Less cash intensive
- Less time consuming at least for first round

### 2) Sale of Harvestree directly to the final user / customer

- Need to evangelize customers
- For customers, details about the sensors (installation, data operation) is very important → need to know him
- Easier to sell more sensors to a customer than to get a new customer



### 3) Co-development and licensing of specific autonomous sensors

- Interesting to collaborate with industrials leaders
- Recurrent money with licensing
- Diversification of revenue

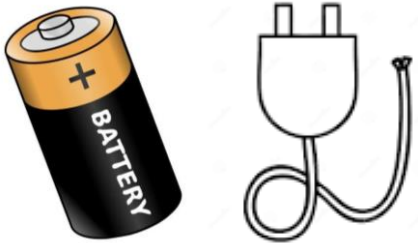


# Competition (1/2)



## Competition & pricing

- Wired temperature sensor (50 – 100 €) + wiring (3k-20k€)
- Battery operated sensor (50 – 200 €) + battery replacement (4k€ and 40 batteries for 10 years in similar usage conditions of Harvestree)
- Manual measurement (1h/week = 2k€/year)
- **Basic HARVESTREE with temperature = 400 €**



	Price	Hidden costs	Sustainability	Performance
Wired sensor				
Measure by operator				
Battery powered				
HARVESTREE				





**TEG**NOLOGY



**PERPETUA**



**AEInnova**  
Alternative  
Energy Innovations

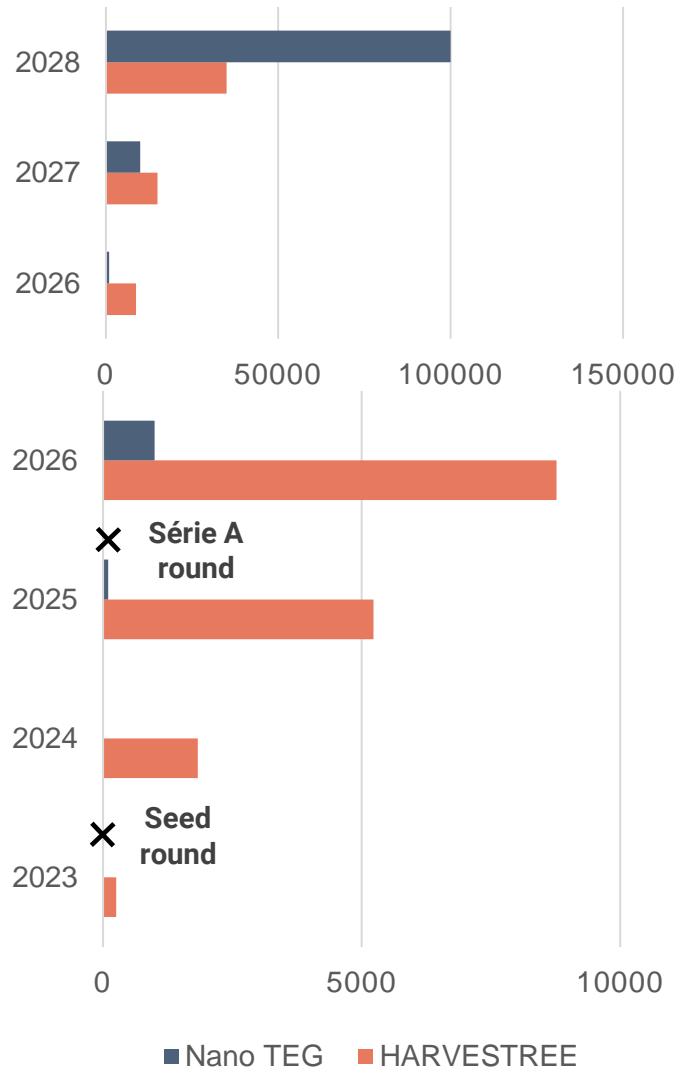


**MOiZ**  
Powering Autonomy

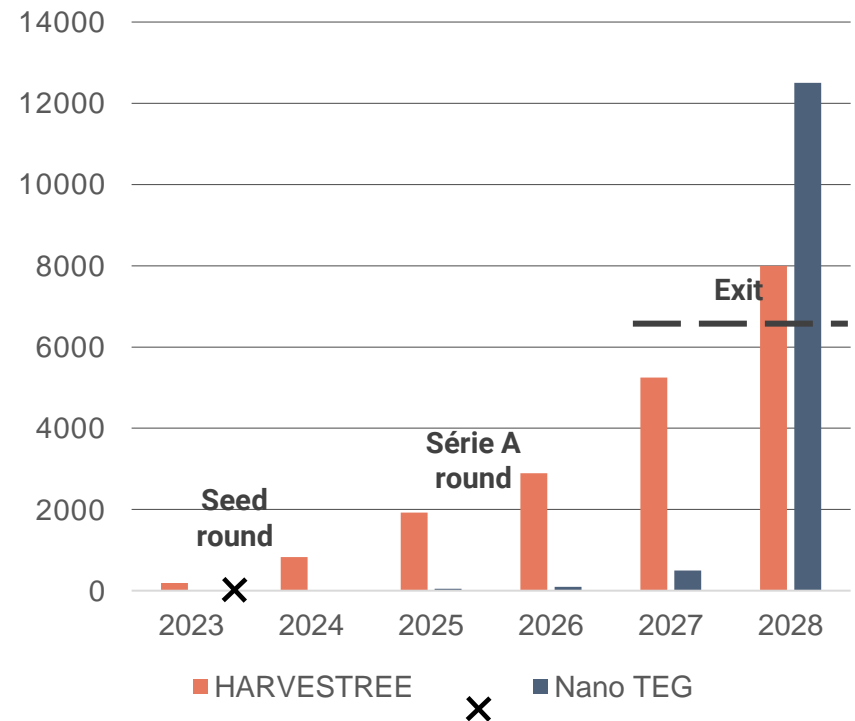
WHO WILL BE THE FIRST THERMAL ENERGY HARVESTING STANDARD ?

	Price (€)	Incorporated In	Integration of sensor	Compacity	Funding
TEGnology	?	2019	NO	YES	Grants ~ 1M€
AEInnova	1500	2014	YES	NO	2 M€
Perpetua	?	2007	NO	YES	3 M€
MOiZ	500	2020	NO	YES	Grants ~ 1M€

## Number of units



## Revenue projection up to exit (k€)



### Seed round :

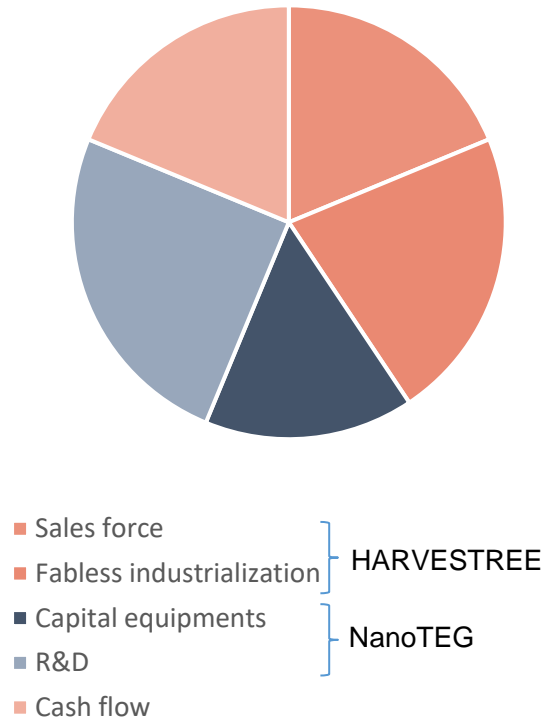
- Industrialization and commercialization of Harvestree
- R&D of nanoTEG

### Serie A round :

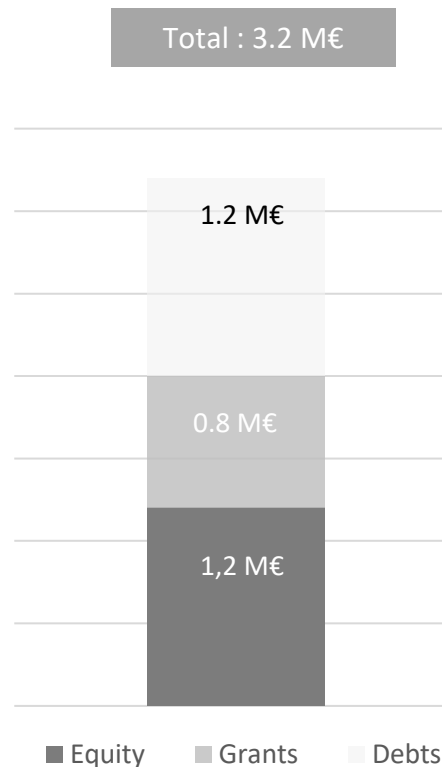
- Commercialisation ww of Harvestree
- Industrialization and commercialization of nanoTEG

# Fundraising opportunity

a. Use of funds



b. Amount of money



c. Keep our advance



Three main competitors that develop thermal energy harvesting as an energy source

**They sell energy**

**We sell autonomy**

## Team : 9 people

6 Ing. & Tech. dealing with all technological aspects

2 partners & 1 scientific adviser (co-founder)

**Dimitri Taïnoff – CEO**



- . Founder
- . Administrative management
- . Projects grants
- . Business development
- . Marketing



**Hervé Deslandes – CTO**

- . High tech components industrialization
- . Prototyping – POCs
- . Team management
- . Quality & Standards
- . Applications & Customers support



## Three dates

First patent: 2016

I-lab deep tech grant: 2018

Startup creation: 2020

## Road map

2020 : team

2021 : customers

2022 : pre-indus

2023 : funds raising

2024 : commercialization & industrialization

→ Our value proposition: **AUTONOMY** applied to sensors for the industrial IoT.

→ Harvesting of « fatal » heat losses to power digital monitoring.

→ Technology protected by three patents.

→ I-lab grants (BPI France) → funds available for the next step.



# MOIZ

## Powering Autonomy



**Dimitri TAÏNOFF – CEO**  
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Tel : 06 630 999 83



**Hervé DESLANDES – CTO**  
[herve.deslandes@moiz-eh.com](mailto:herve.deslandes@moiz-eh.com)  
Tel : 07 82 28 90 22

Breakthrough and multi-patented technology

Huge potential of environmental impact

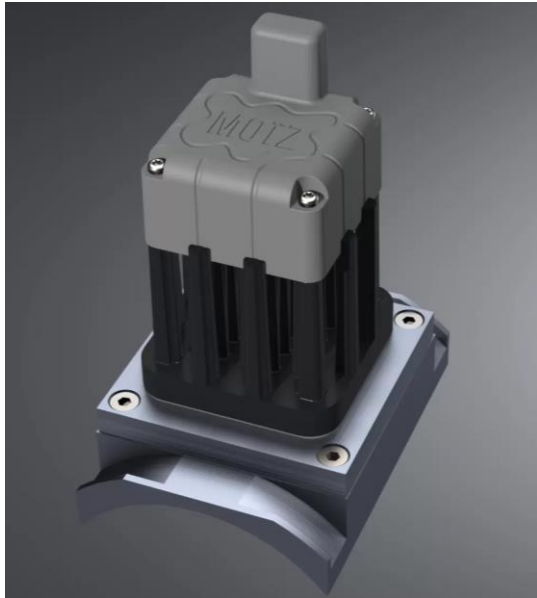
Several worldwide top-tiers customers

Technology ready-to-industrialization

Fabless strategy : no cash-intensive

Opportunities of exit at quite short term

## Fabless industrialization of Harvestree modules



### Today: Pre-industrialization with AXANDUS

- Easytech support (Minalogic)
- Waterproof module
- Industrial design
- Various tests carried out (salt spray, vibrating pot...)
- Custom antenna

### Tomorrow : industrialization with new partner

- RFI in progress
- 1000 to 10000 pieces
- Redesign to cost
- Important normative aspect
- Assembly in AURA or France
- Parts in France or Europe except Peltier China or USA

# Projected organizational chart

