



**ERICSSON**

# MARKET POTENTIAL FOR SOFC IN TELECOMMUNICATIONS INFRASTRUCTURE

Rome, 22 September 2017

# AGENDA

- › Introduction
- › Energy consumption analysis
- › Market analysis
- › Addressable market
- › Conclusions



# INTRODUCTION



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JOINT UNDERTAKING

The objective of the market analysis is to identify if exists a real potential market for SOFC/SNCB hybrid solution in the infrastructure of the Telecommunication Operators



SOFC: solid oxide fuel cell  
SNCB: sodium-nickel chloride batteries

One of the most important themes, that currently are on top of the Telecommunication Operators agenda, is to develop environmentally better and finally sustainable solutions

Potential environmentally friendly solutions such as SOFC will have surely opportunities of growth; ONSITE consortium exploited this trend

# ENERGY CONSUMPTION ANALYSIS

IN TELECOMMUNICATION AREA



Growth of data traffic in mobile/fixed networks

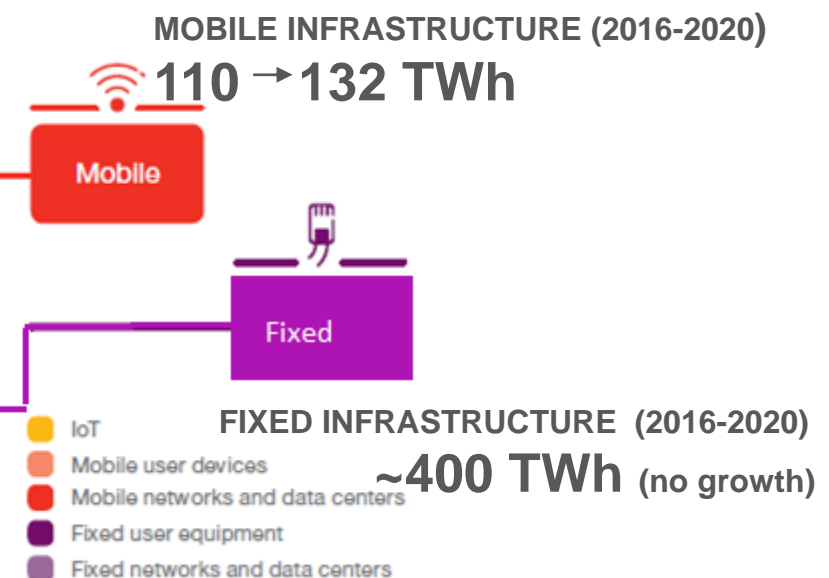
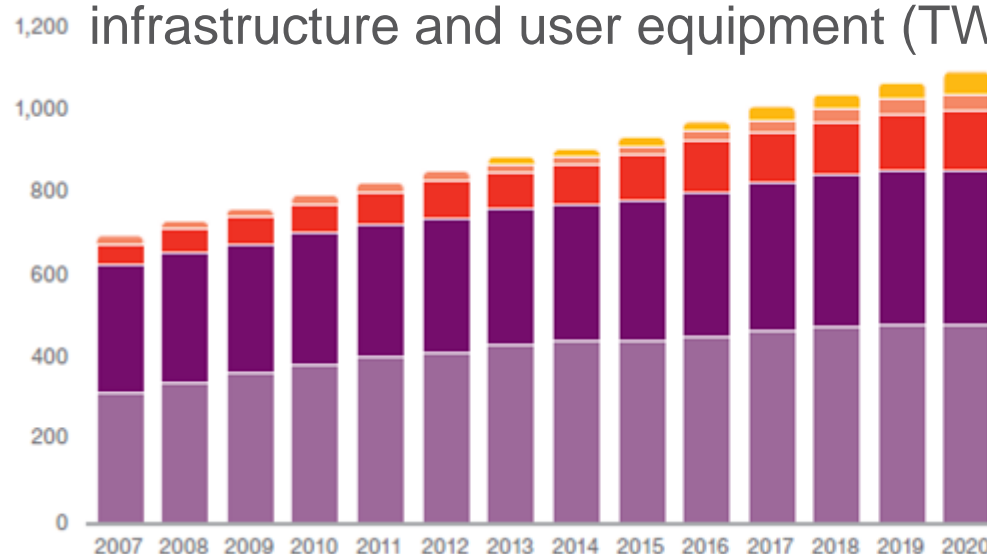


Traffic essentials	2016	2022 forecast	CAGR 2016-2022	Unit
Total Mobile data traffic	8,8	71	42%	EB/month
Total Fixed data traffic	70	170	15 %	EB/month

source:  
Ericsson Mobility Report

EB=10<sup>9</sup>GB

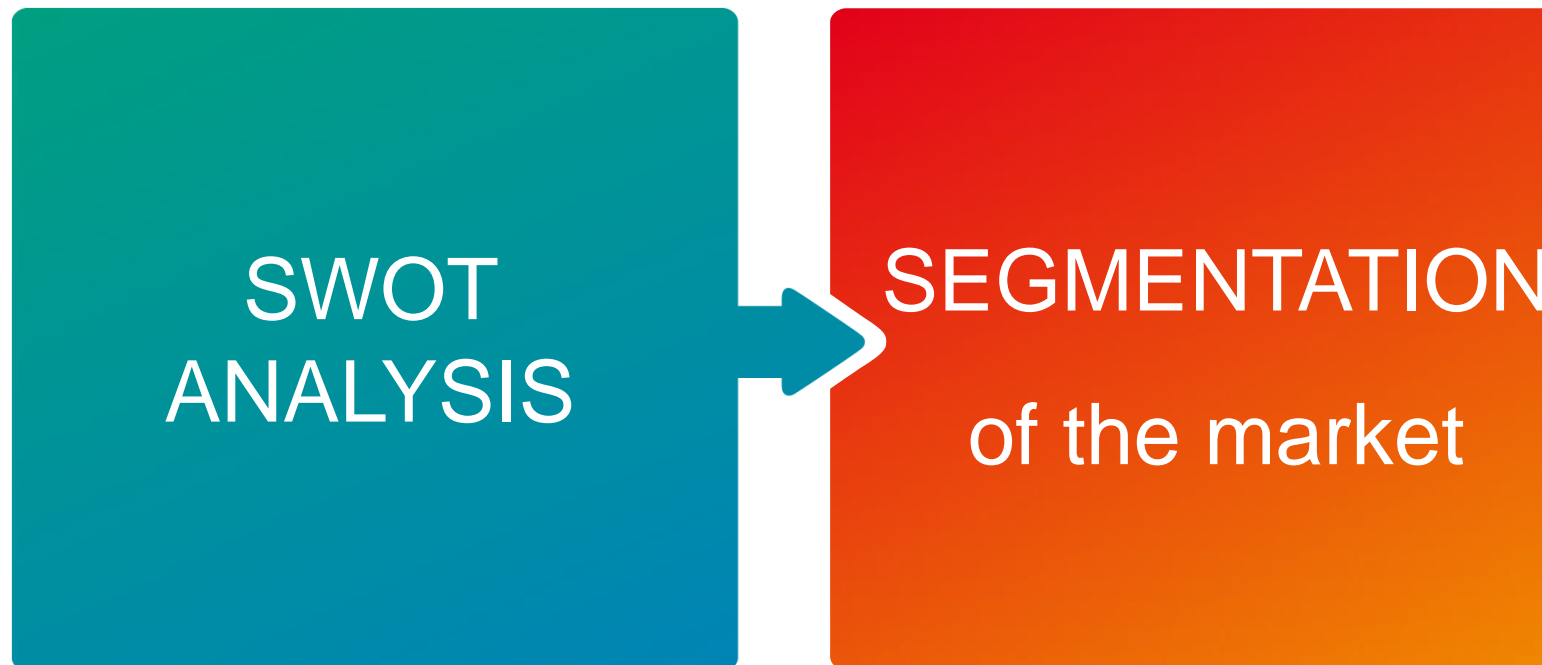
Global energy consumption for network infrastructure and user equipment (TWh)



# MARKET ANALYSIS



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# SWOT ANALYSIS FOR SOFC/SNCB



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## STRENGTHS

- Effectiveness SOFC solution (efficiency is around 40%)
- Flexible solution thanks to the composition in subsystems of 2.5 kW
- The high temperature batteries handle the power peak demand and act as UPS
- Advantage to use traditional fuels (natural gas, liquefied petroleum gas)

## WEAKNESSES

- The solution is still in a state of concept
- For a massive roll-out the solution should be reengineered by reducing size and weight of the apparatus
- Must increase durability
- Must decrease CAPEX

## OPPORTUNITIES

- Big market potential in the Telecom industry: current high energy costs and the EU target of sustainability for 2020 are slowly forcing many operators to adopt low-emissions solutions such as SOFC
- Capability of the current system of using the thermal energy produced by the system in a Telecommunication site for cooling scope

## THREATS

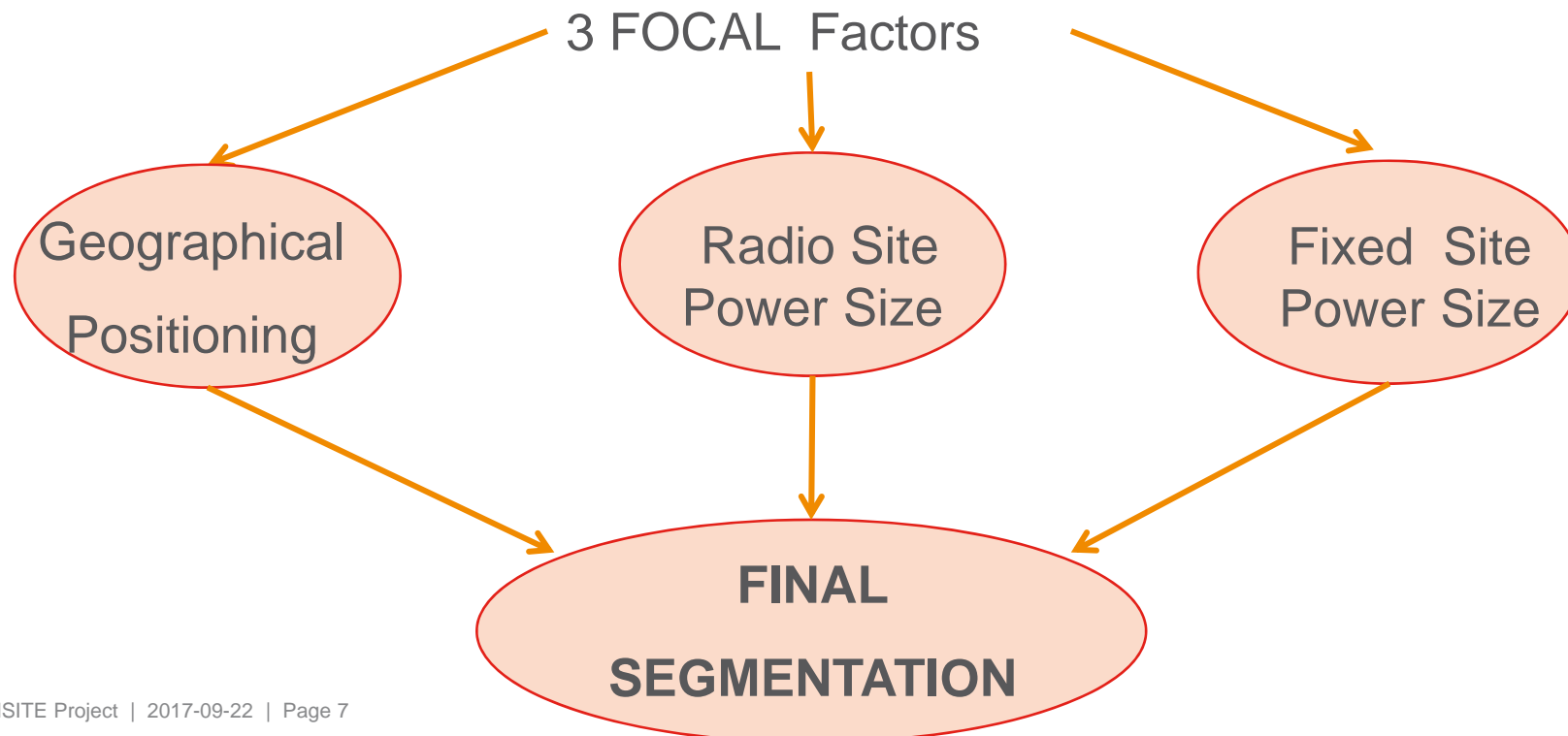
- Sites selection should take into account connection to a gas supplier. Very difficult to have the availability of a gas network in rural areas.
- Environmental constraints, lack of space for the equipment and permits issues.

# SEGMENTATION



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We need to evaluate the infrastructure of the Telecommunication Operators, identify the differences among the operators and select the areas where the operators can use the SOFC solution with the best performance





# GEOGRAPHICAL POSITIONING

SOFC solution needs to have the gas network in proximity to the site

## URBAN/SUBURBAN AREAS

- 😊 Radio & Fixed sites close to gas network
- 😊 Fixed sites: ground positioned
- ☹️ Radio sites: several in roof top configuration

In roof top configuration, many issues of implementation of SOFC solution imposed by weight limits, lack of available space, ongoing contracts, permits



“Roof top” radio site

## RURAL AREAS

- ☹️ Radio & Fixed sites far from gas network
- 😊 Fixed sites: ground positioned
- 😊 Radio sites: ground positioned (raw-land sites)

In rural areas, connection to the gas network may be a big problem.

There are few central offices located in rural areas



“Raw land” radio site



# POWER SIZE



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## Radio Sites (sites of mobile network)

- The range of power size ranging from 2,5 kW to 12 kW according to numbers of Operators hosted, technologies implemented (such as GSM, UMTS, LTE) and amount of mobile traffic. Energy consumption of cooling system is around 25/30% of the total consumption.

## Sites of Fixed Network (central offices)

- Small site (5 kW - 10 kW)
- Medium site (10 kW- 50 kW)
- Big site (> 50 kW)

***The composition of SOFC in modules of 2.5 kW is highly adaptable to all the radio sites and small central offices of fixed network up to 10 kW.***

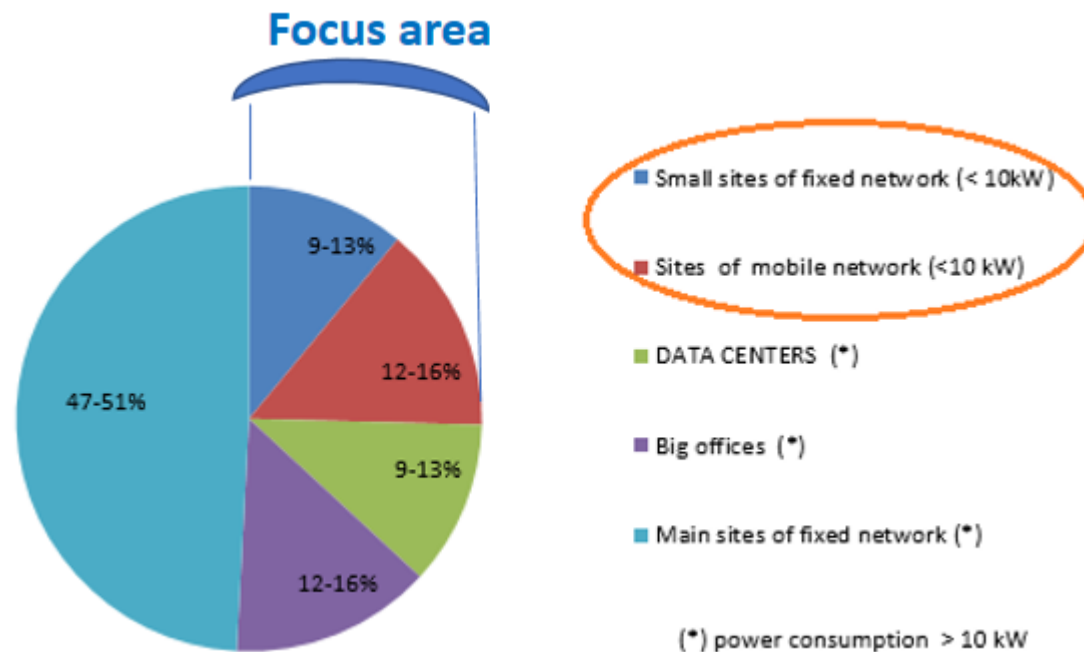
# EXAMPLE: ENERGY CONSUMPTION DISTRIBUTION OF A BIG OPERATOR (WITH MOBILE AND FIXED NETWORK)



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## Identification of Focus Area

ONSITE solution can cover around 20-30% of the total energy consumption



# FINAL SEGMENTATION



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An analysis of

- typical consumption distribution of Telecommunication Operator
- potential operative issues

drives the Consortium to address its efforts *on the development of small sized power supply system (up to 10 kW) for fixed and mobile networks. The solution should be engineered by reducing size and weight of the apparatus.*

## Target Sites

- Fixed Site (5-10 kW)

Easy target



- 
- Radio Sites

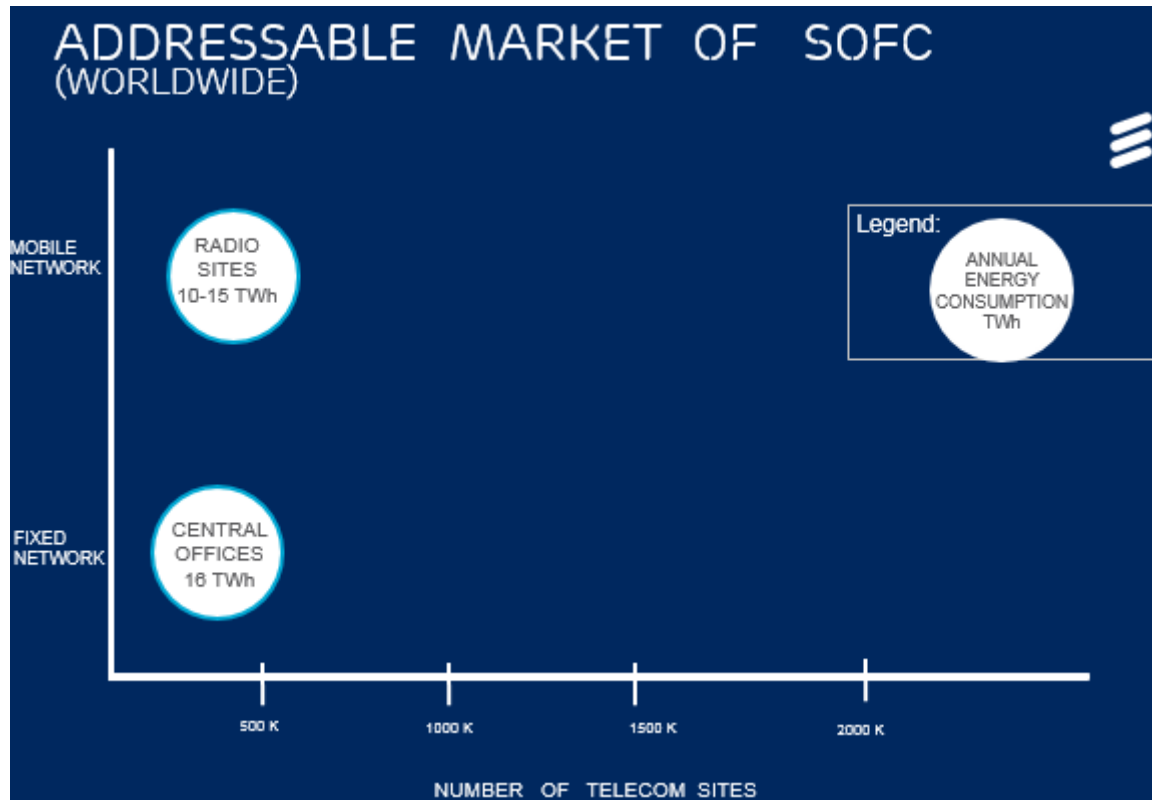
Critical target



# ADDRESSABLE MARKET (WORLDWIDE)



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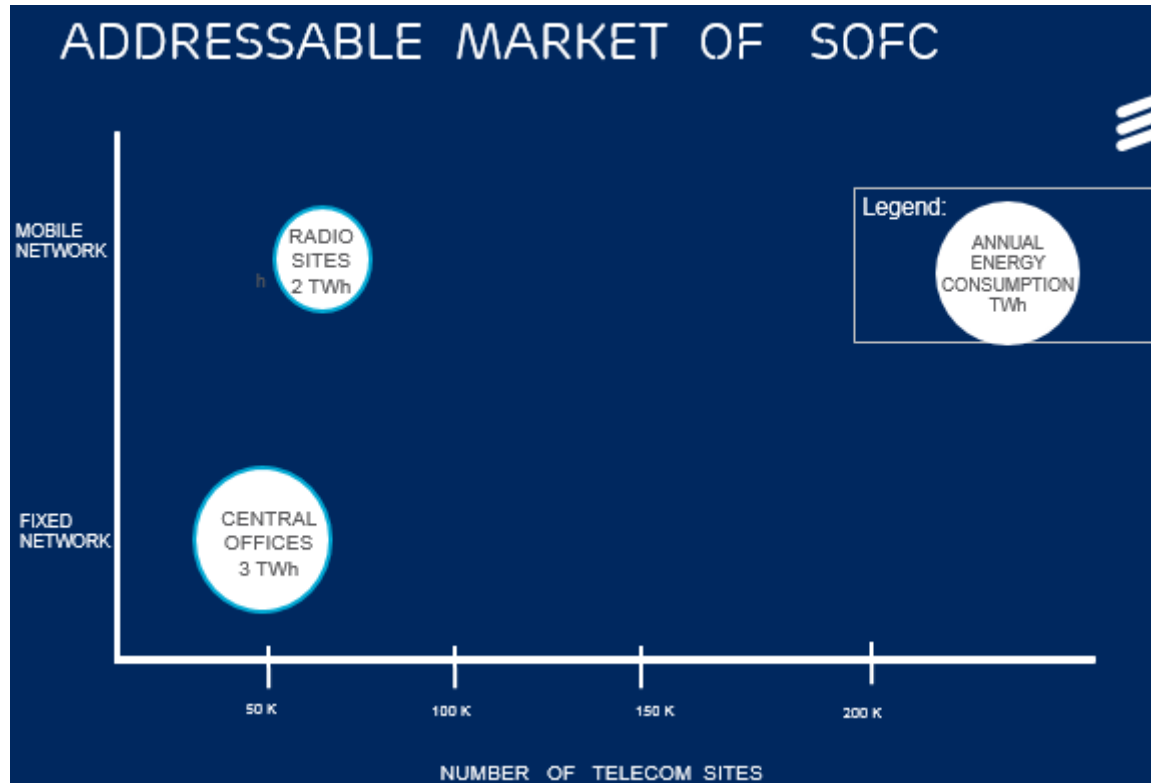
**n° of radio sites of Mobile Network (up to 10 kW):** approximately 300.000, **around 10%** of the total amount, with an annual consumption energy of about 10-15 TWh (value estimated)

**n° of small central offices of Fixed Network (up to 10 kW):** approximately 250.000, **about 70%** of the total amount, with an annual consumption energy of about 16 TWh (value estimated)

# ADDRESSABLE MARKET (EUROPE)



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**n° of radio sites of Mobile Network (up to 10 kW):** approximately 60.000, about 10% of the total amount, with an annual consumption energy of over 2 TWh (value estimated)

**n° of small central offices of Fxed Network (up to 10 kW):** approximately 50.000, about 70% of the total amount, with an annual consumption energy of about 3 TWh (value estimated)

# CONCLUSIONS (1/2)



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## Main operational needs of the Operators

- › Energy bill reduction
- › Payback period less than four years of innovative generator
- › Environmentally friendly solution (CO<sub>2</sub> emission reduction)



# CONCLUSIONS (2/2)



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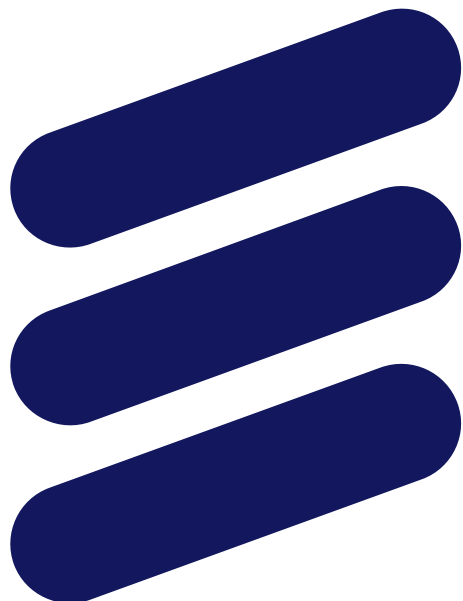
**Addressable market exceeds five hundred thousand telecommunication sites in the world.**

The SOFC could be very appealing to the Operators and pave the way for an innovative power generator aimed to cut-down battery back-up (the public grid shall be used as back-up).



Electricity generation efficiency of SOFC is 40% (approaching 55%) and - since the generation is at the Operator's site at DC, the novel SOFC solution decreases emissions per kWh consumed by the TLC station.





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