



# 5G Enabling Decarbonization in Manufacturing and Logistics

***From Theory To Practice:***  
**Initial Evaluation From Real World Use Cases**

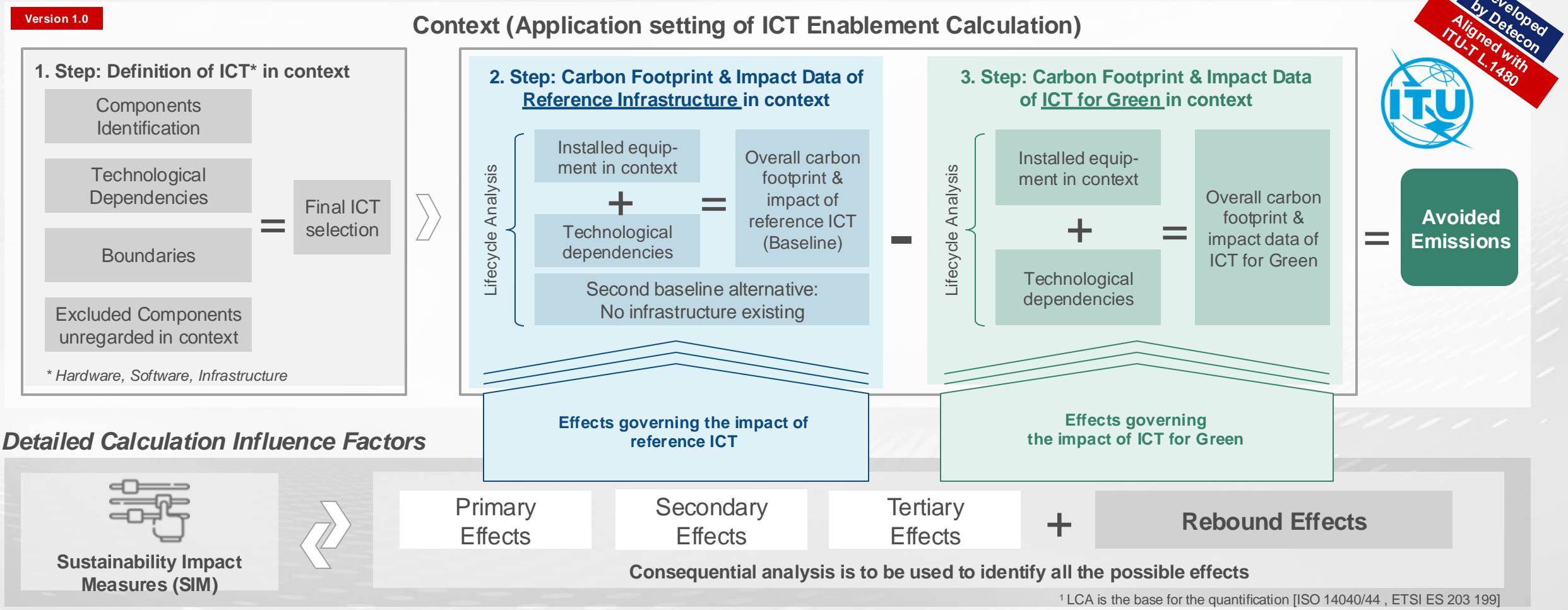
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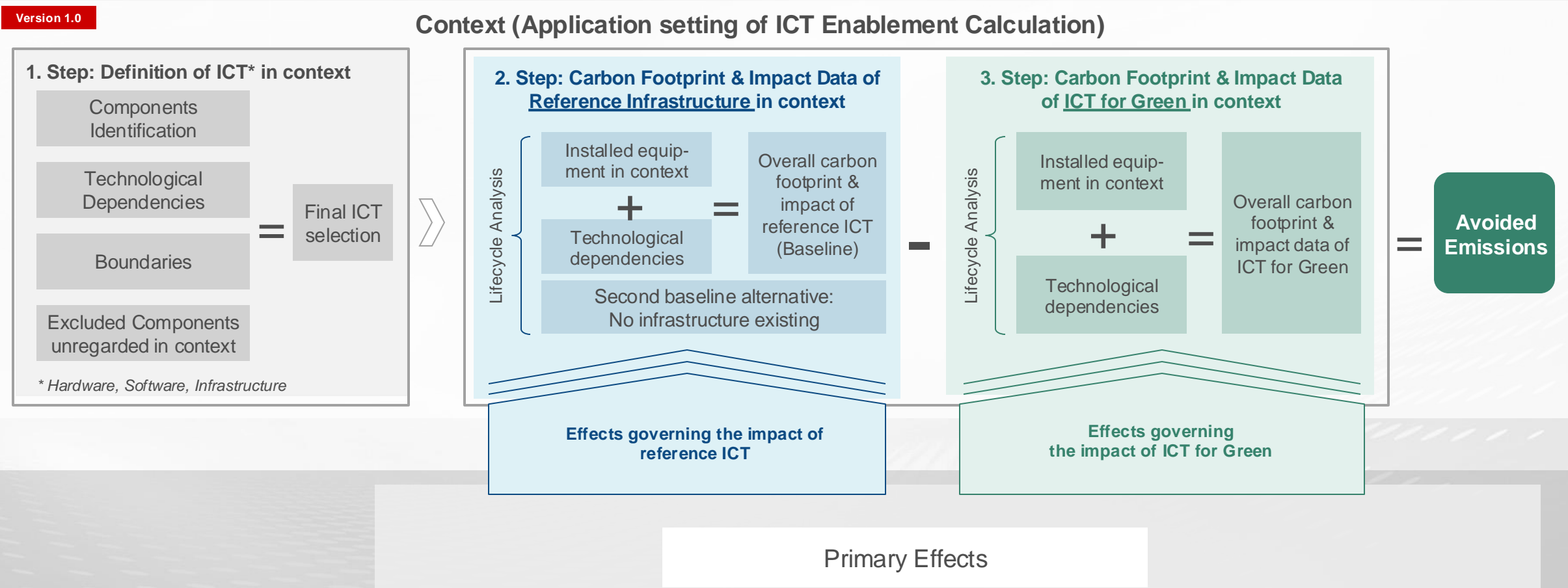
# ICT Carbon Enablement is the decarbonization resulting from using specific ICT solutions in a defined context and system boundary.

## Core Enablement Quantification Calculation



# We evaluated the primary effects in the real vertical industry with two dedicated use cases.

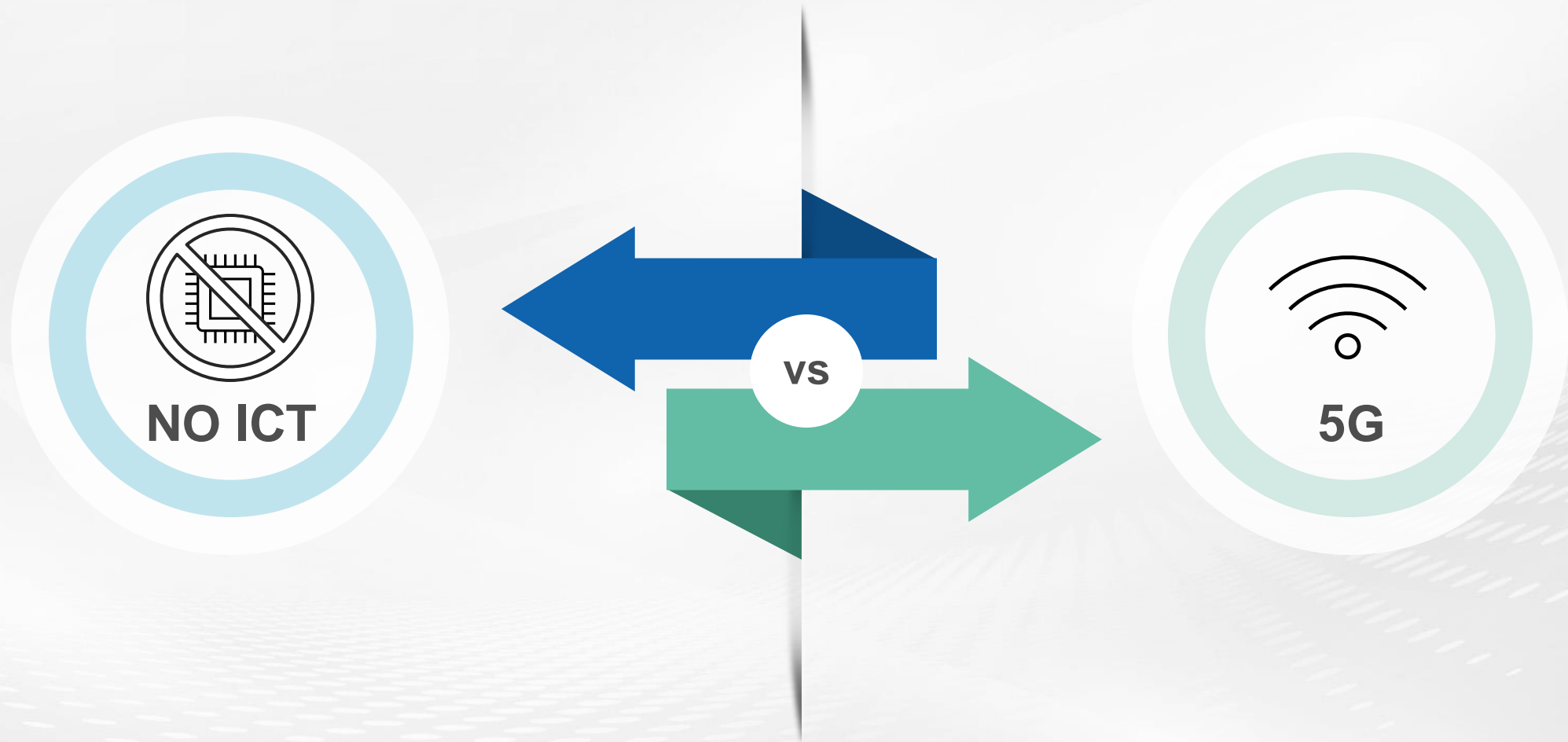
## Core Enablement Quantification Calculation



<sup>1</sup> LCA is the base for the quantification [ISO 14040/44 , ETSI ES 203 199]



# Comparing the 'No-ICT' Scenario with the facility in the innovative 'ICT' Scenario.



# Two use cases were evaluated based on insights from the site operators at the industrial site.

## Describing the use case

Logistics



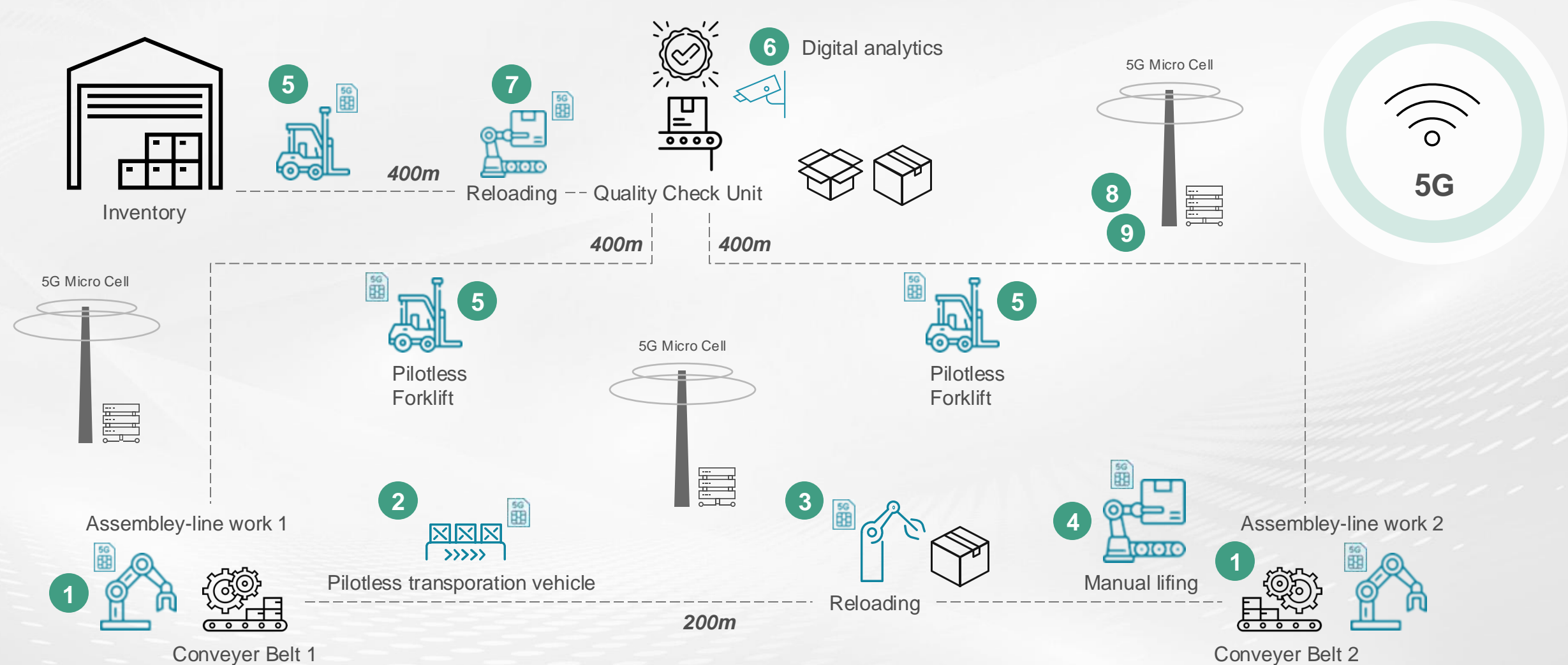
Manufacturing



There are various manual processes with slow and resource-intensive operations validated with the site operator in the evaluation process.



In the ICT use case scenario for the manufacturing use case, a few components are replaced with pilotless devices enabled by the 5G technology.



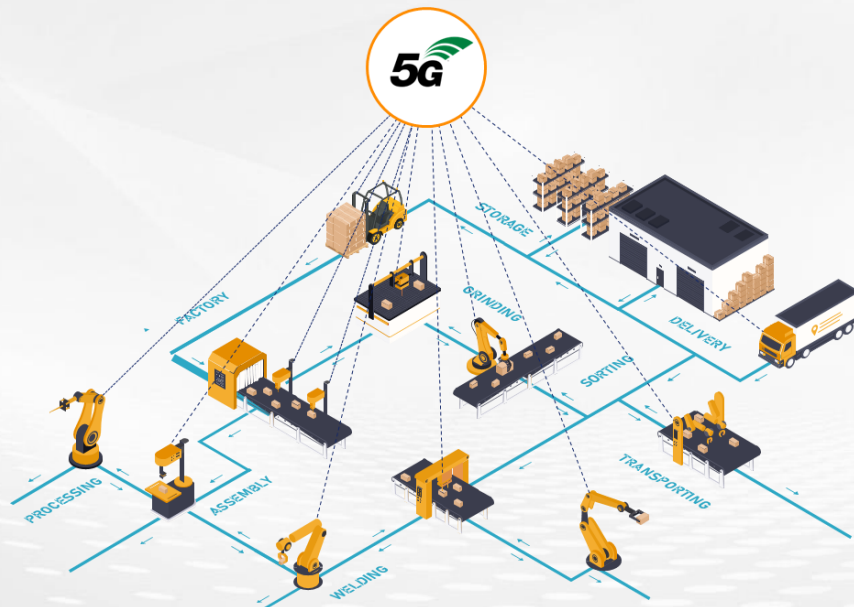


# Evaluation of the physical integration of ICT with 5G can help decarbonize by ~6.1kt CO<sub>2</sub>e compared to No-ICT manufacturing and logistics scenarios.

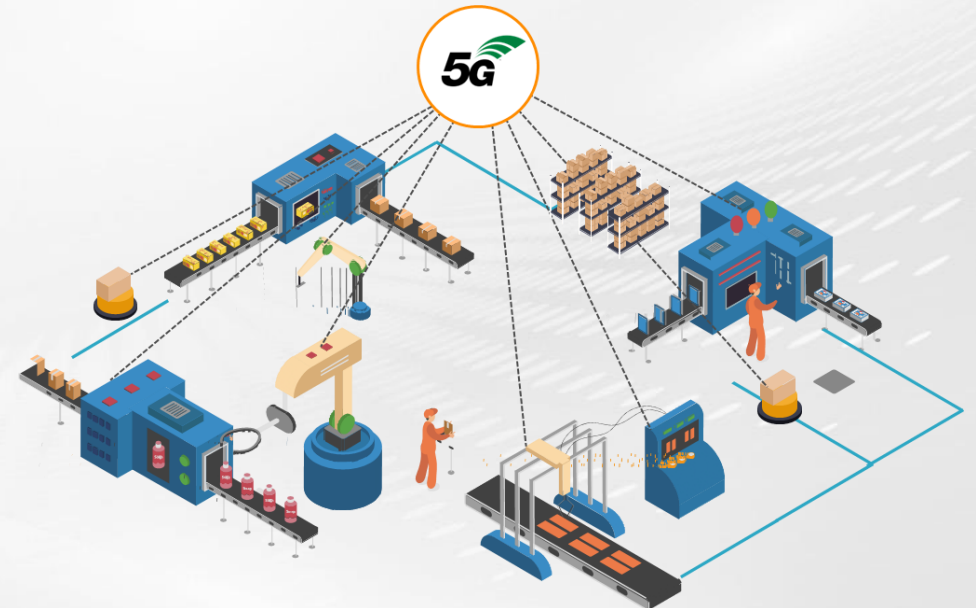
**Up to 94.8%**  
Reduced Carbon Emission  
compared to No-ICT



**Up to 92.6%**  
Reduced Carbon Emission  
compared to No-ICT



LOGISTICS



MANUFACTURING



## Example: Renewal energy and connectivity offered by 5G are among the major levers enabling significant carbon reduction in the primary effect evaluation.



### **Renewal energy decreased emissions.**

Due to the use of conventional fuels like diesel, the no-ICT scenario is very carbon intensive, which is improved by Germany's more renewal energy mix in the ICT scenario.



### **Power capabilities of 5G help decrease emissions.**

By facilitating the connection of multiple devices, 5G technology plays a crucial role in reducing carbon footprint compared to No-ICT scenario.



### **Virtualization made process green.**

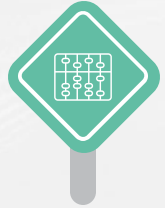
Virtualizing data flows with 5G connectivity makes day-to-day operations more efficient and carbon-light, compared to the tedious and labor-intensive No-ICT processes of the past.



### **Fast device communication complement human effort.**

Fast communication among AGVs and other devices in ICT scenario complements human efforts, making processes more optimized and efficient compared to No-ICT scenario.

# From **Green** Marketing to **Green** Innovation, From Lean to **Green** operations.



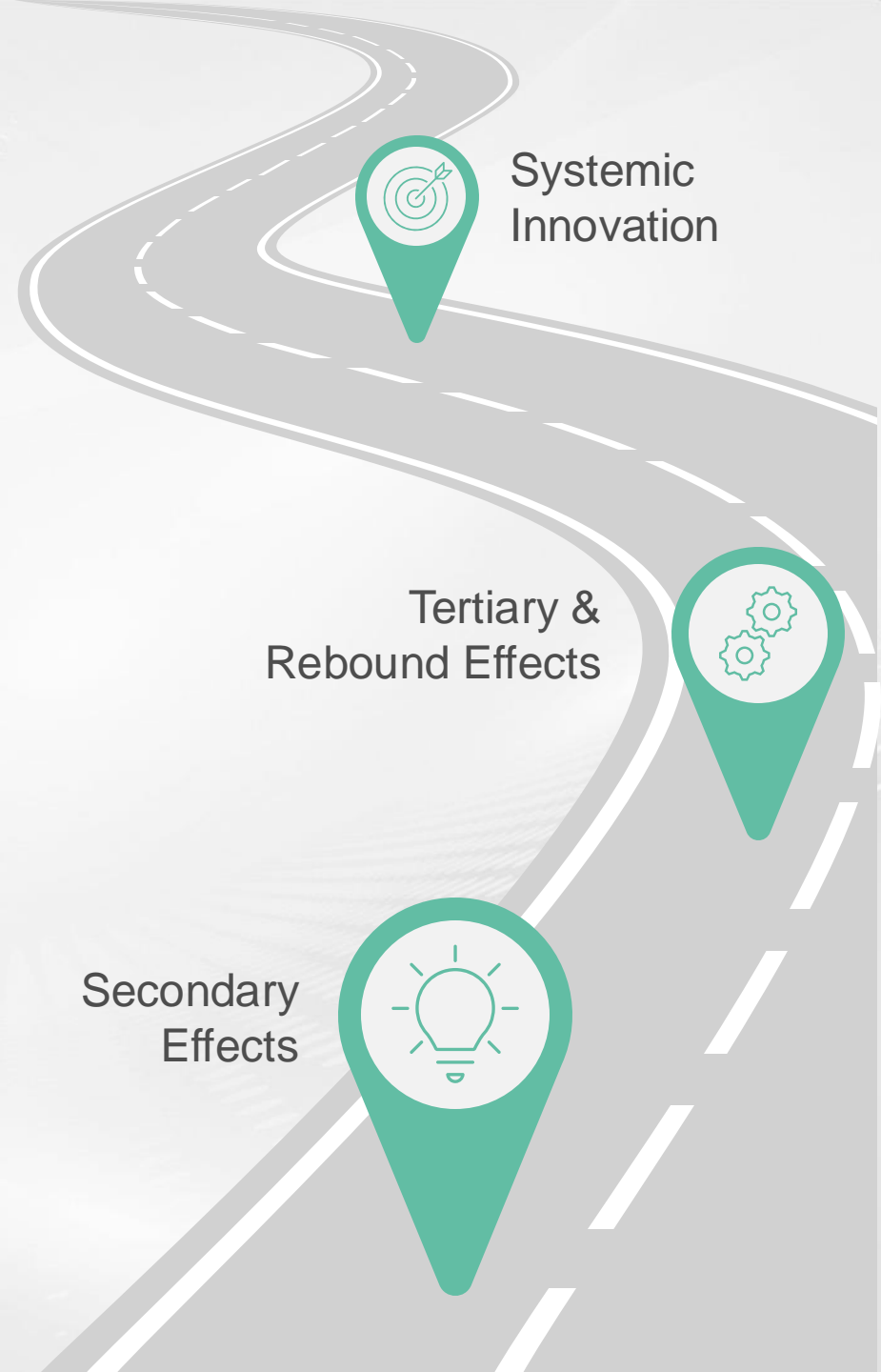
## Calculation of Further Effects

Developing over the existing insights, it is essential that we further calculate the enabling impact of ICT considering secondary and tertiary effect along with rebound to utilize and share the insights for green digital twin transition beyond green marketing to Green innovation.



## Fostering Green Operations

Using the insights from the enablement method, it is imperative to further assist businesses to optimize and adapt green technologies mindfully to have a more lean and green digital operations meet the net-zero targets and be future ready.





# Thank you.



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