



Provide the **most reliable conditioned transport** of sensible and vital supplies, everywhere in the world **at zero emission operation** crafting a smarter planet

Our Way Forward



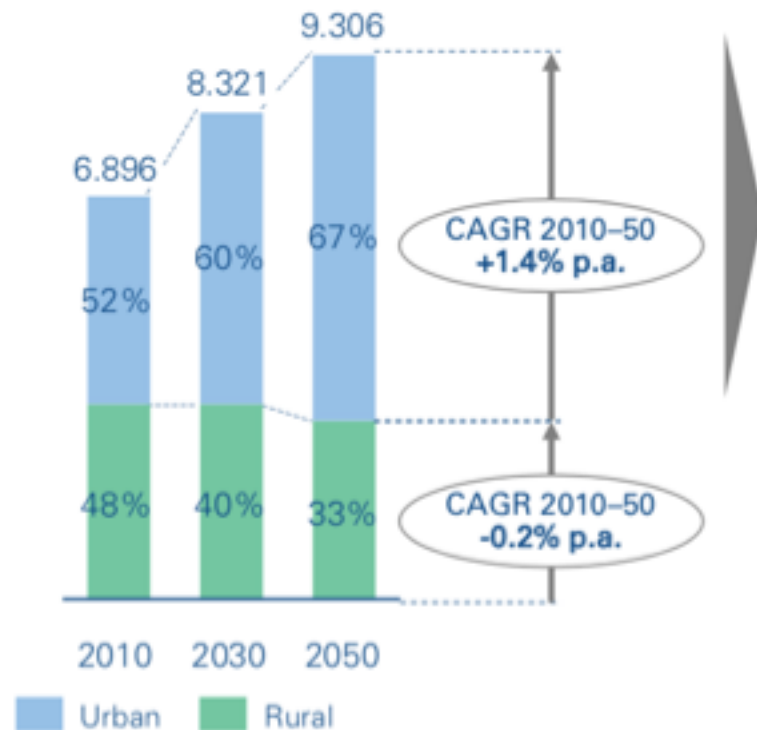
**Zero emission transport refrigeration
solution for purely electric light
commercial vehicles**



Urban goods mobility demand grows

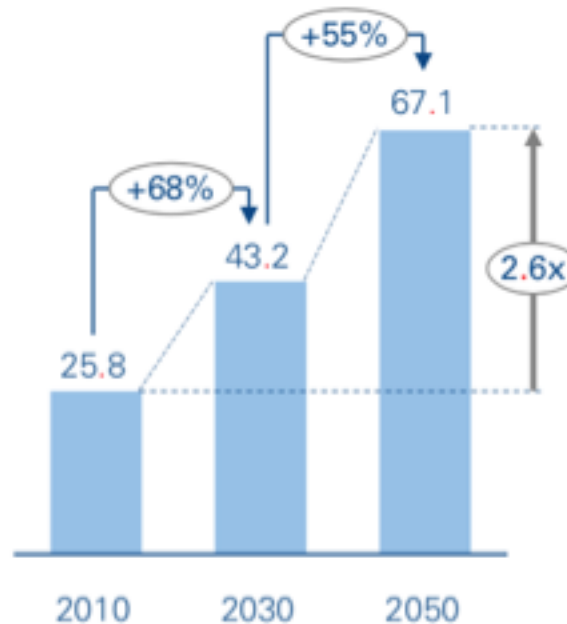
The world is becoming increasingly urban

Urban and rural population, 2010–2050 [m people; %]



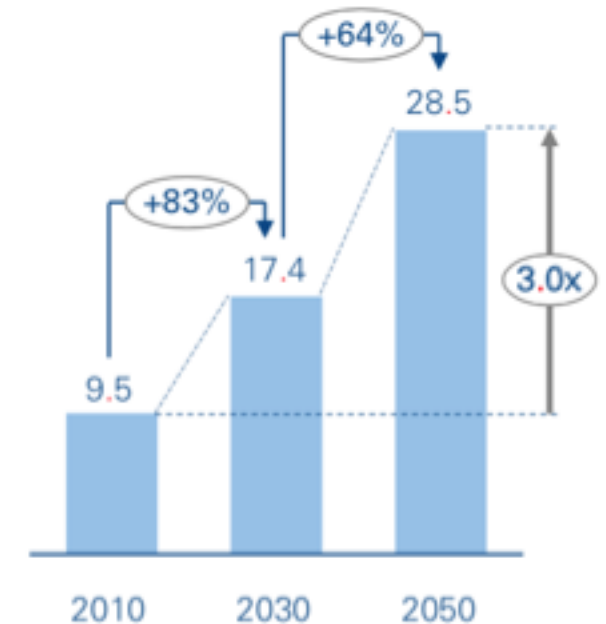
Urban passenger mobility demand explodes

Urban passenger mobility demand, 2010–2050 [trillions people-km p.a.; %]



Urban goods mobility demand explodes

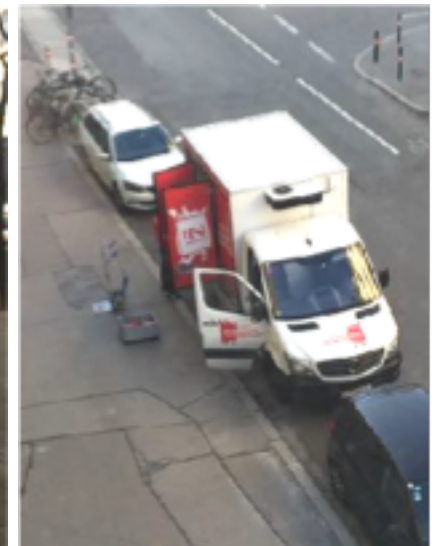
Urban goods mobility demand, 2010–2050 [trillions of tons-km p.a.; %]



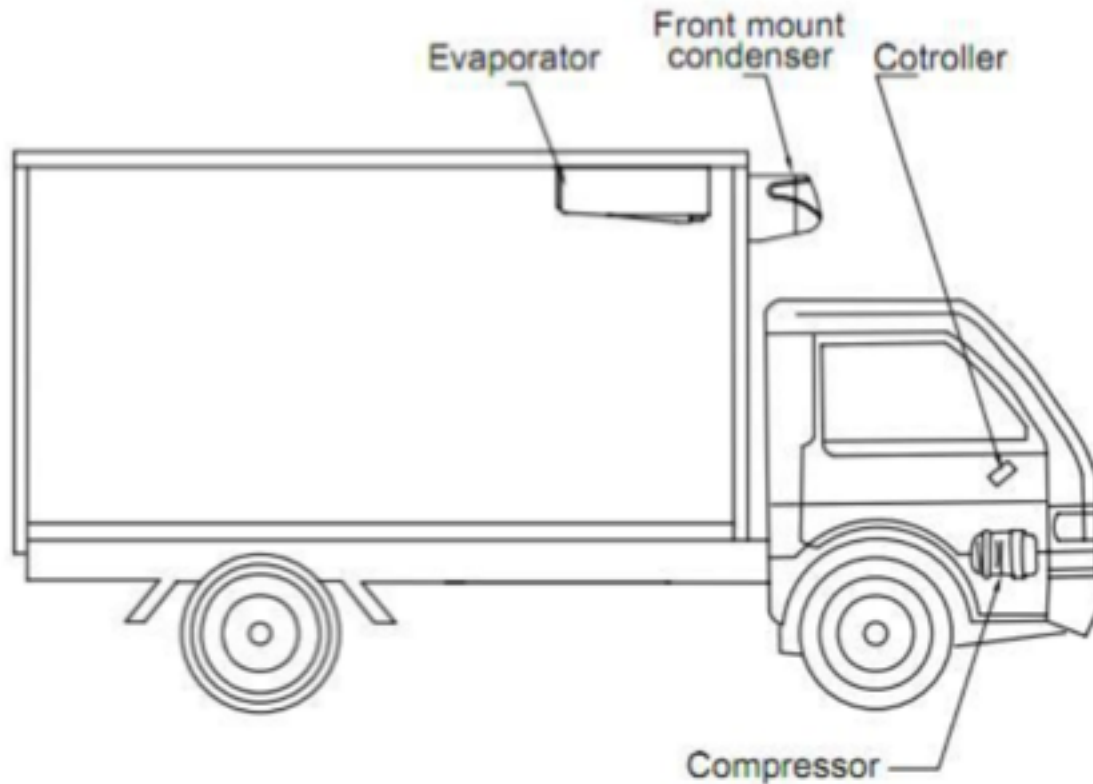
Market Needs/Growth Reasons



This is how it looks (in Vienna, Austria)

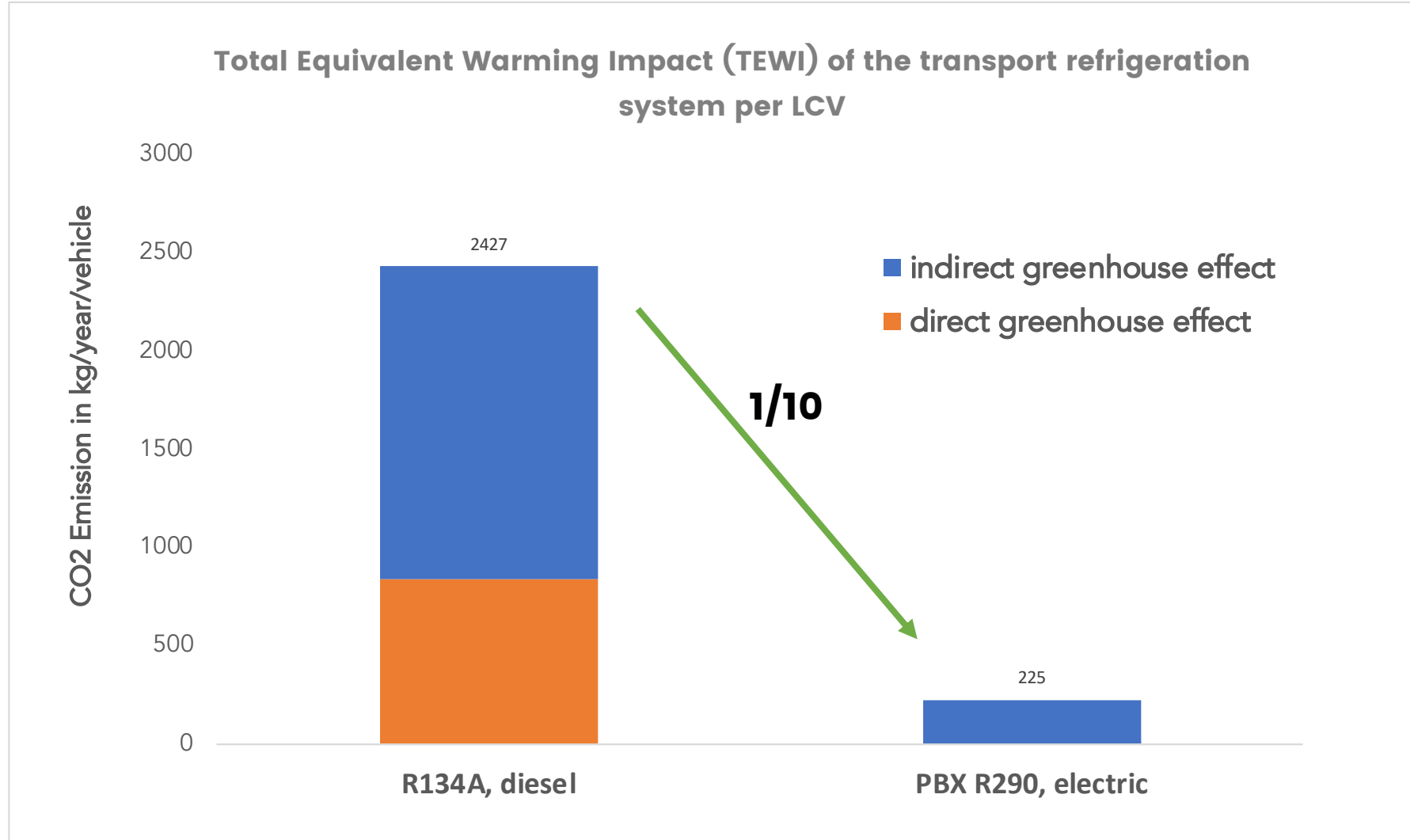


How does a transport refrigeration system work today?



Decarbonize the (temperature controlled) freight transport?

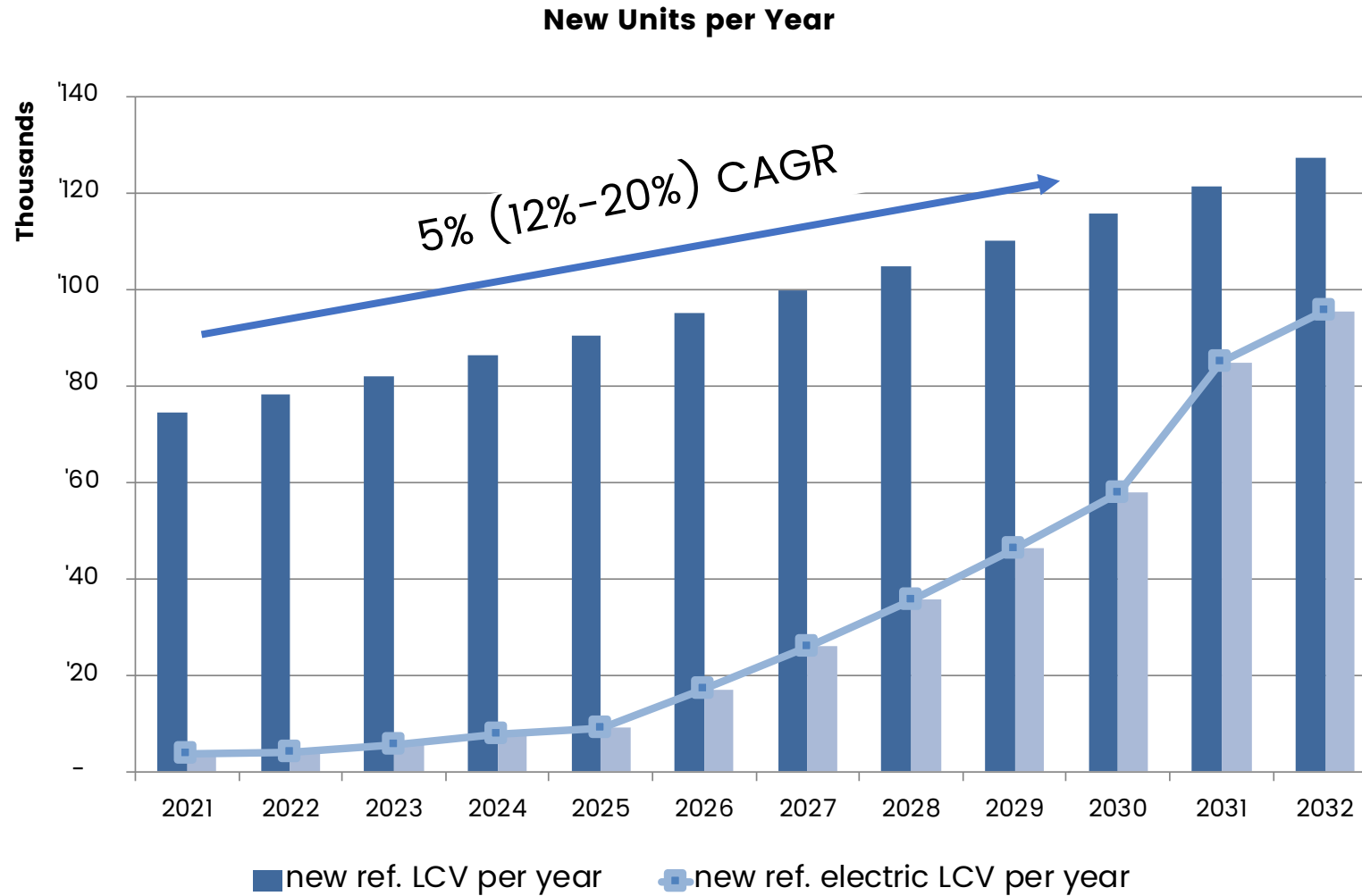
Feasible Impact of ZE transport refrigeration system



Refrigerated Fleets in Europe (2019)

Country	*ATP fleet	National fleet	Vans	Trucks	Trailers & semi-trailers
Belgium	3 000	22 000	12 791	4 589	4 620
Czech Rep.	4 250	20 000	13 820	4 400	1 780
France	120 000	150 000	85 500	33 000	31 500
Germany	25 500	180 000	78 744	59 886	41 370
Italy	56 700	115 000	69 888	35 824	9 288
Netherlands	5 250	35 000	13 748	7 720	13 532
Poland	9 500	80 000	44 132	17 452	18 416
Portugal	4 150	22 000	11 215	4 578	6 207
Spain	112 500	120 000	73 815	31 964	14 221
UK	N / A	84 000	50 000	16 000	18 000
EU10	N / A	828 000	453 653	215 413	158 934
EU28	N / A	1 000 000	530 456	235 210	234 344

The Impact



The Impact

year	number of electrified vehicles replacing diesel LCVs	cum. number of electrified vehicles replacing diesel LCVs	CO2 emission standard diesel LCV with refrigerant R134A	CO2 emission electric LCV with refrigerant R290	CO2 emission reduction with 120g/kWh	CO2 emission reduction with renewable 0g/kWh
			t/year	t/year	t/year	t/year
2022	3'824	3'824	27'016.10	3'156.35	23'859.75	27'016.10
2023	3'910	7'734	54'637.93	6'383.47	48'254.46	54'637.93
2024	5'747	13'481	95'242.03	11'127.33	84'114.70	95'242.03
2025	7'759	21'240	150'057.56	17'531.55	132'526.02	150'057.56
2026	9'052	30'292	214'009.02	25'003.14	189'005.88	214'009.02
2027	17'108	47'400	334'877.27	39'124.43	295'752.84	334'877.27
2028	25'948	73'348	518'194.12	60'541.74	457'652.38	518'194.12
2029	35'628	108'976	769'902.26	89'949.34	679'952.91	769'902.26
2030	46'212	155'188	1'096'382.51	128'092.74	968'289.78	1'096'382.51
2031	57'765	212'952	1'504'482.84	175'771.98	1'328'710.86	1'504'482.84
2032	84'914	297'866	2'104'390.31	245'860.46	1'858'529.85	2'104'390.31
2020-2030			t	t	t	t
sum			6'869'191.96	802'542.52	6'066'649.43	6'869'191.96



We will move to a low-carbon world because nature will force us, or because policy will guide us. If we wait until nature forces us, the cost will be astronomical.

— Christiana Figueres, former Executive Secretary of the UNFCCC



Legislation Change as Opportunity

F-Gas Regulation



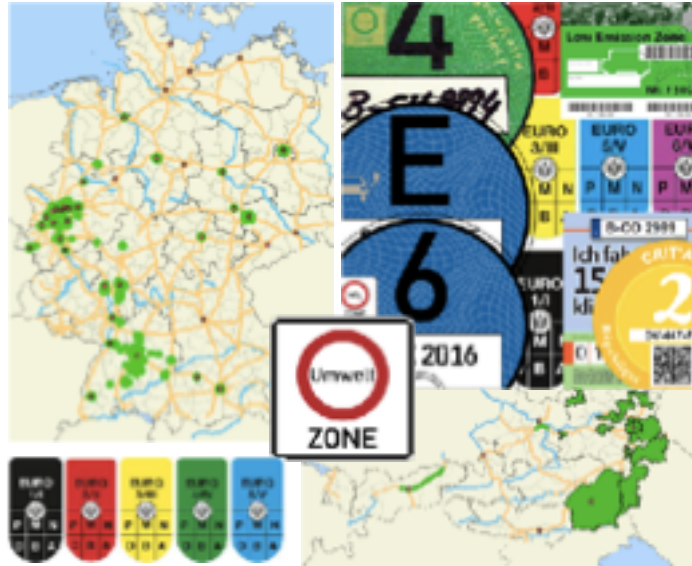
Engine Emissions



Acoustic Emissions



one tank R404 10kg = annual fuel of 14 cars



19.00 - 22.30 < 65 dB
22.30 - 07.00 < 60 dB

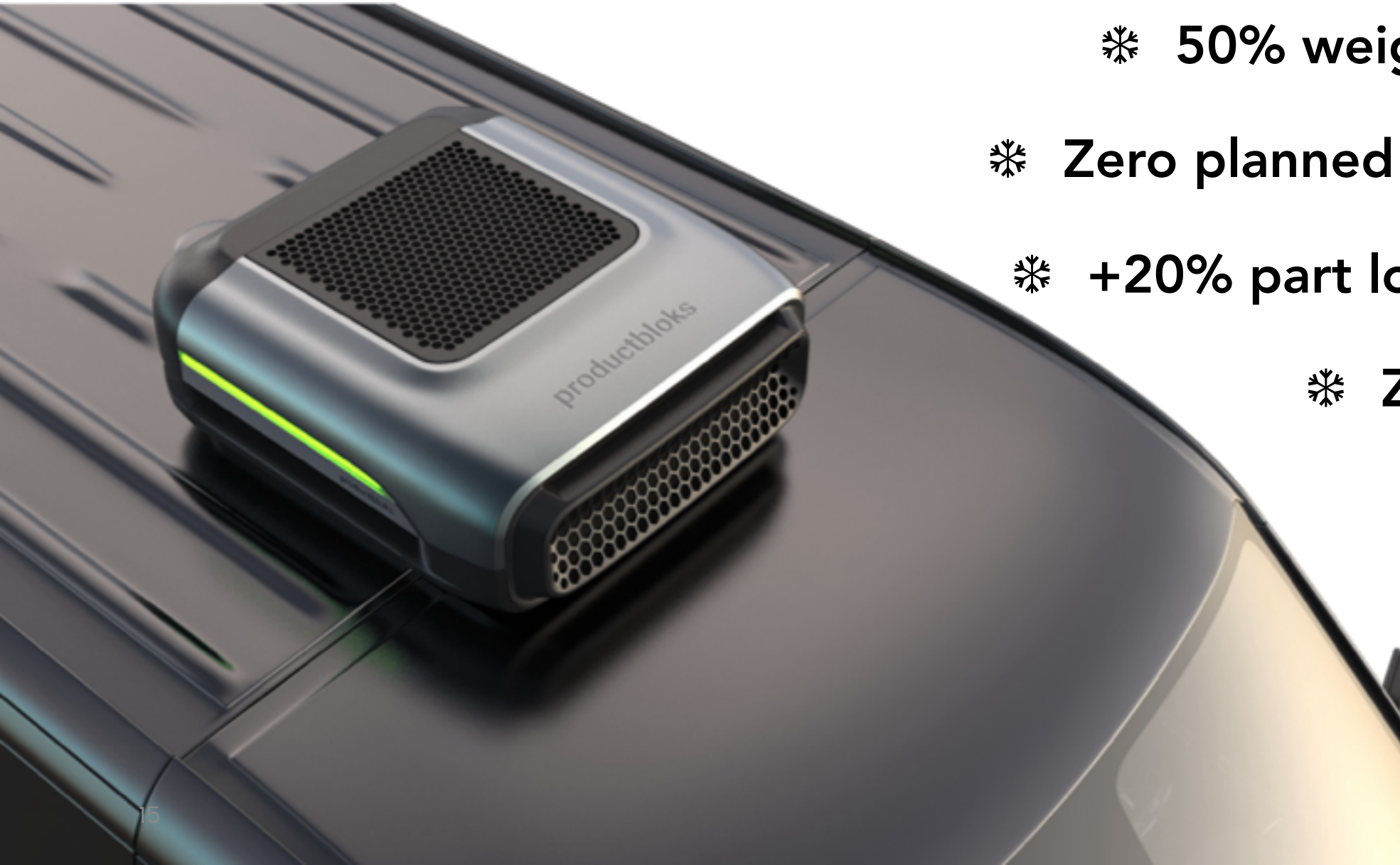


The Refrigerant

The first propane (R290) transport refrigeration unit on the market



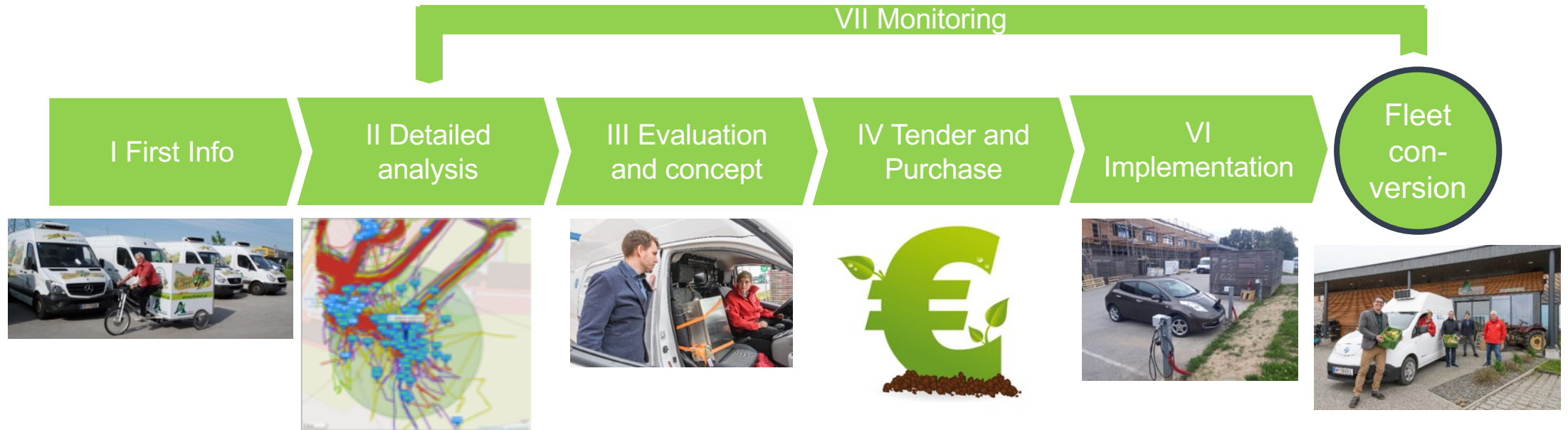
The Product



- ❄ 50% weight reduction
- ❄ Zero planned maintenance
- ❄ +20% part load efficiency
- ❄ Zero emission
- ❄ low noise

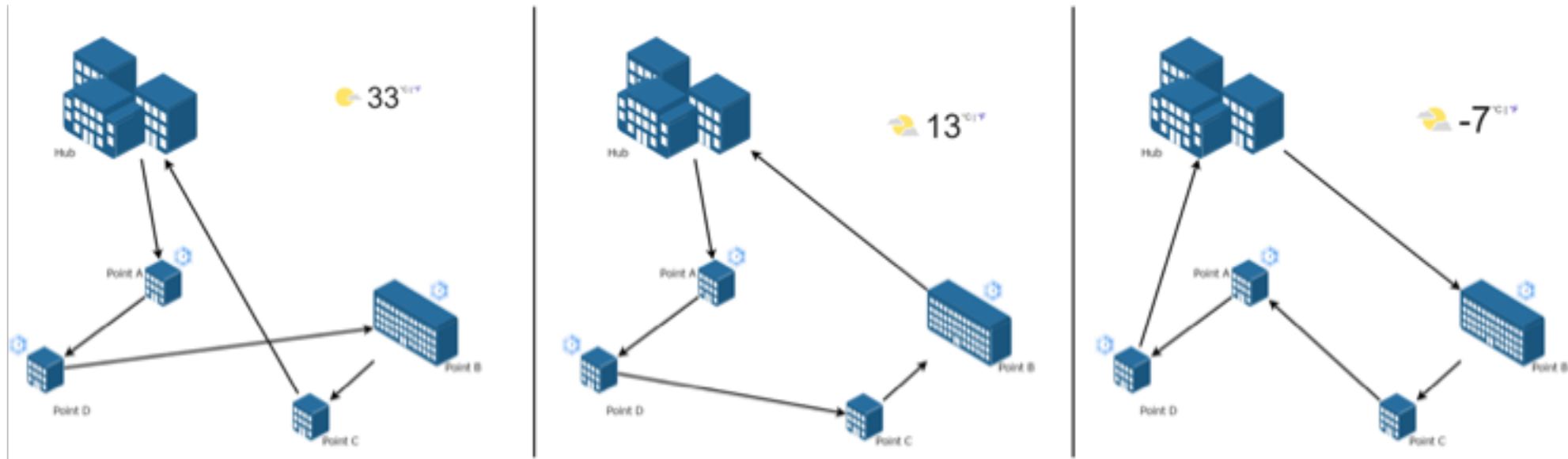
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A Roll-Out Guide



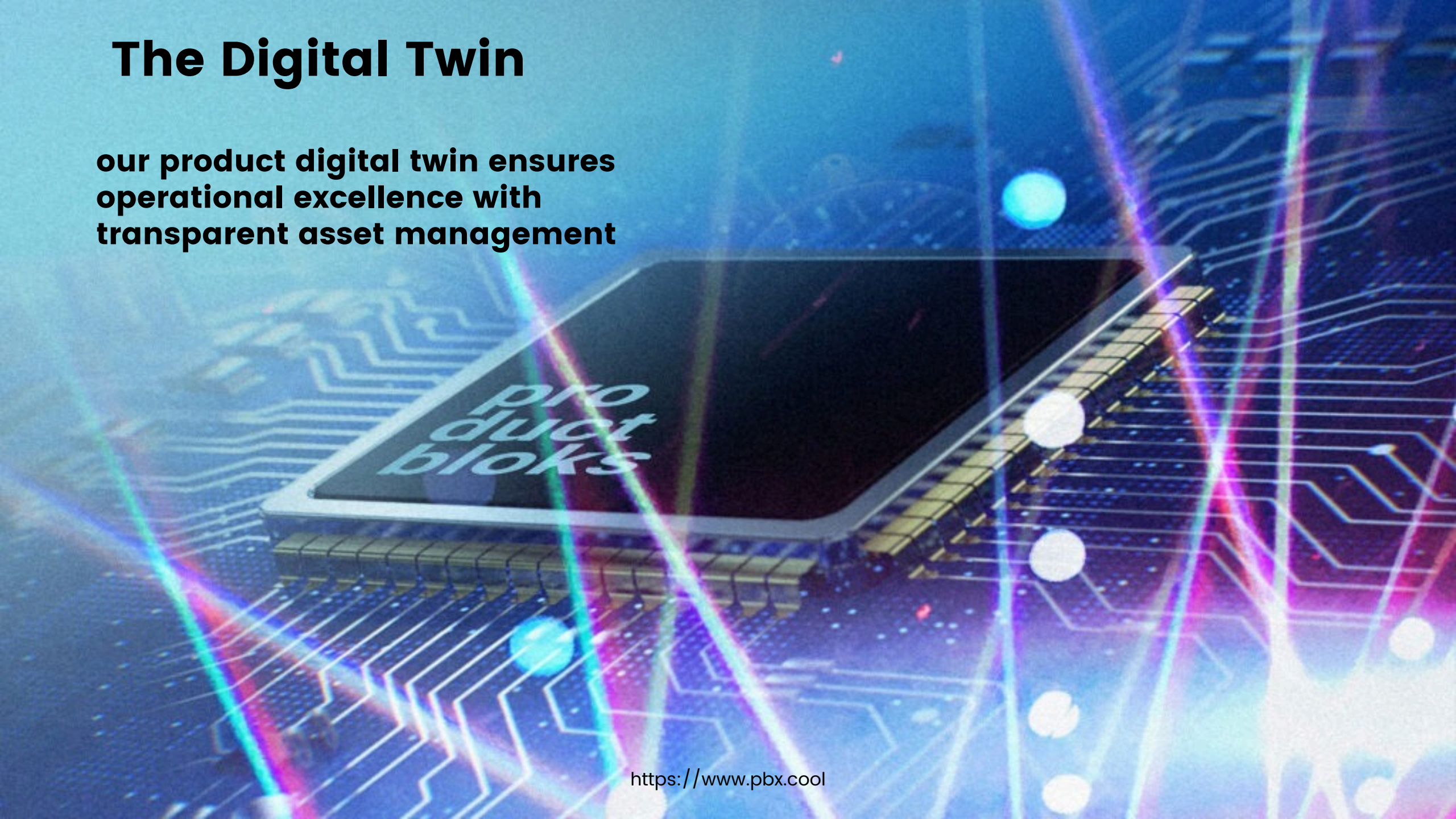
The Digital Services

- Minimize daily operating uncertainties by
 - 3R principle: Assign the **R**ight Asset to the **R**ight User to the **R**ight tour by means of digital twin methodologies and AI algorithms
- Maximize Asset Rest Value by continuous system monitoring and value assessment



The Digital Twin

**our product digital twin ensures
operational excellence with
transparent asset management**



*product
bloks*

One-Stop-Shop Opportunity



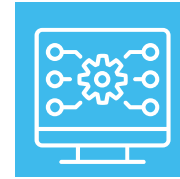
Vehicle Selection

- Energy demand analysis
- Different brands acc. requirements



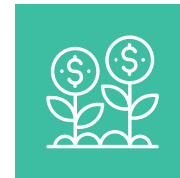
Vehicle Conversions

- Thermal insulation
- productbloks Refrigeration unit



Digital Services

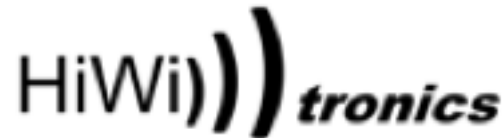
- performance and State-of-Health Analysis
- Continuous Rest-Value Assessment



Financing

- Leasing Concepts
- Performance Based Contracts (Pay by Use)

Our Research and Technology Partners



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Thank you

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