



STEUNPUNT CIRCULAIRE ECONOMIE

Estimating demand and supply potential for circular value chains – the case of EV battery remanufacturing

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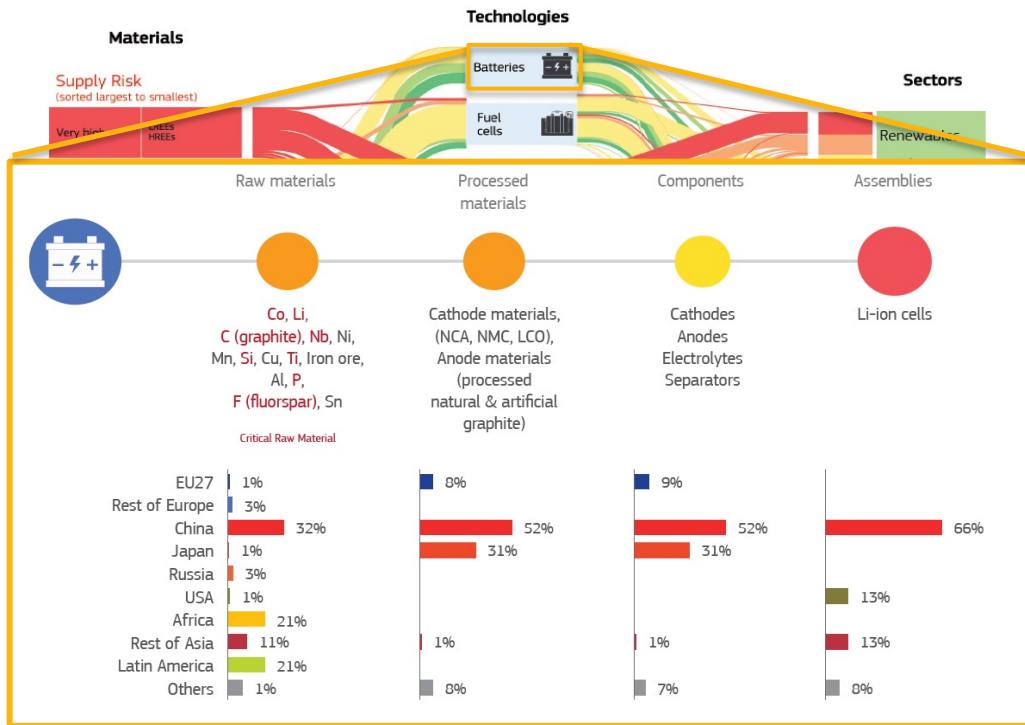


Key messages



- A Flemish Remanufacturing Hub for batteries from electric vehicles CAN offer significant economic and environmental value, PROVIDED evolutions of supply and demand for remanufactured batteries are sufficiently aligned
- To harness the potential of circular economy in Flanders, we should start with strategic stock monitoring of key products and materials in Flanders

Energy transition depends on critical raw materials



Flanders, like Europe, depends on the use of CRMs for its energy transition

Being a region without primary CRM supplies, what can our role be in this challenge?

Being a region with a high consumption of these materials, can circular economy be (part of) the answer?



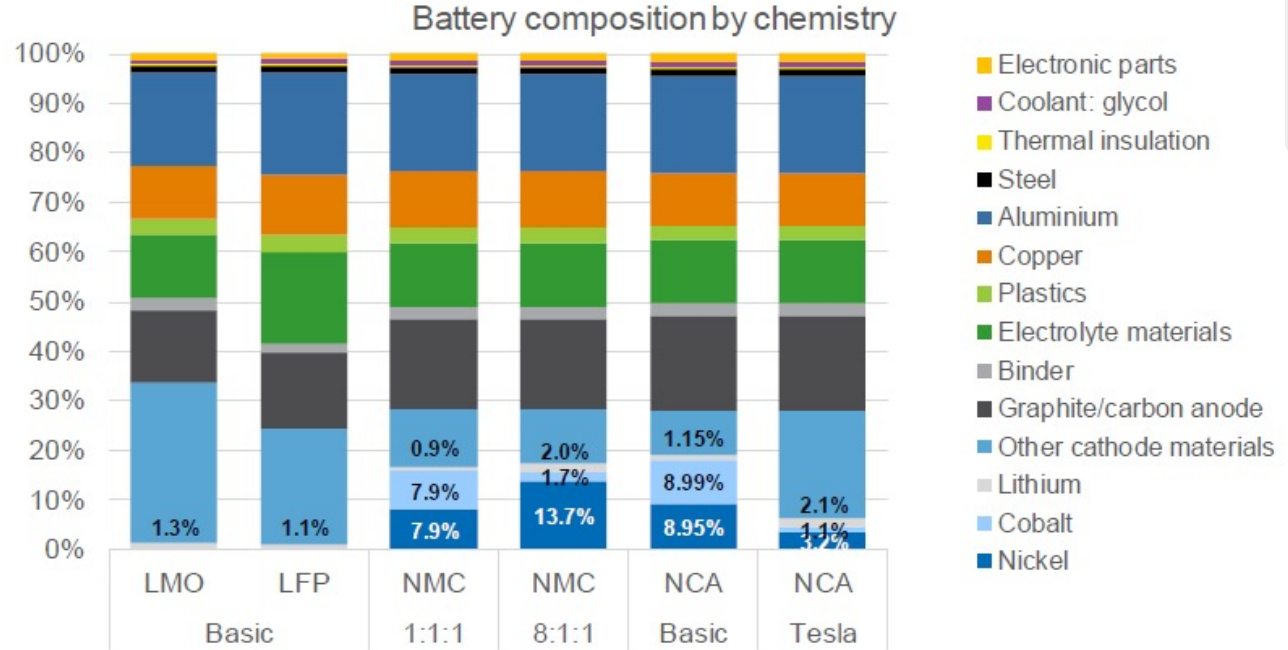
Li-ion batteries (LIB) in electric vehicles (EV) as a case study



Electric vehicle (EV) batteries: a case study

Lithium & Graphite:
relevant across
different types of Li-
ion batteries (LIB)

Cobalt & Nickel:
differentiators!



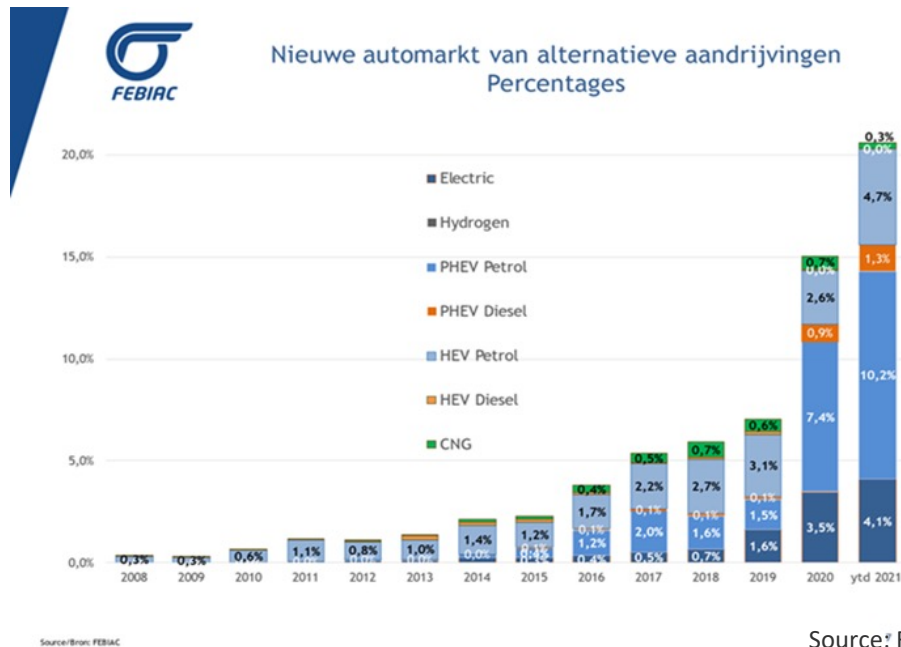
Increasing EV demand



EV demand will drastically increase in Flanders...

...and so will the amount of LIB that become available at end-of-life of these EV

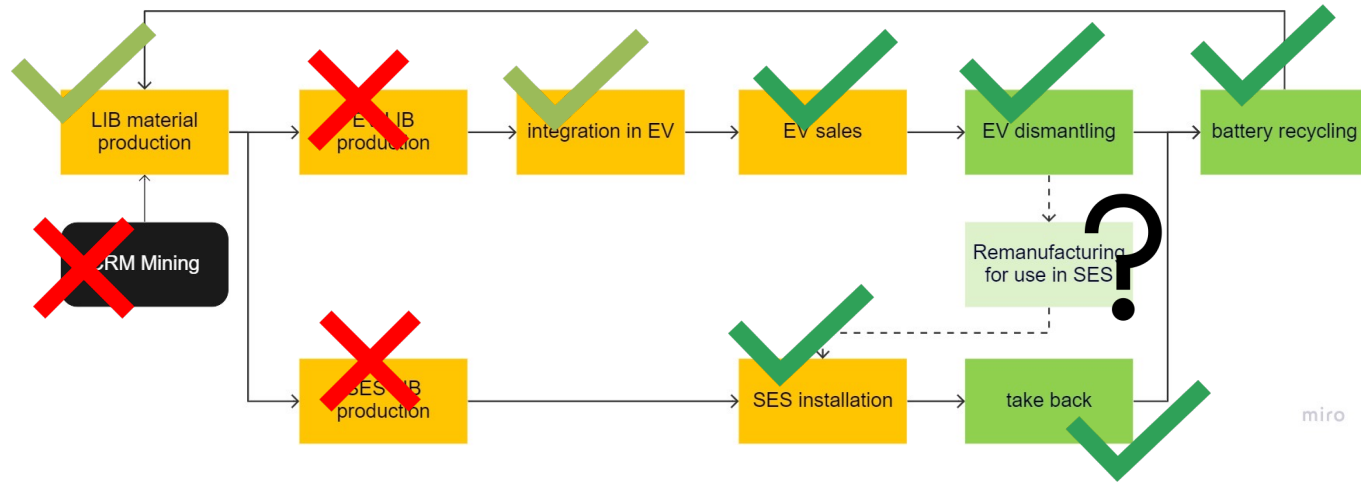
...and demand for LIB for stationary energy storage is on the rise!



Nina Verhaeghe,
Pieterjan Huyghebaert
zo 07 nov 05:55

Thuisbatterijen verkopen als zoete broodjes door hoge elektriciteitsprijs en afgeschafte terugdraaiende teller

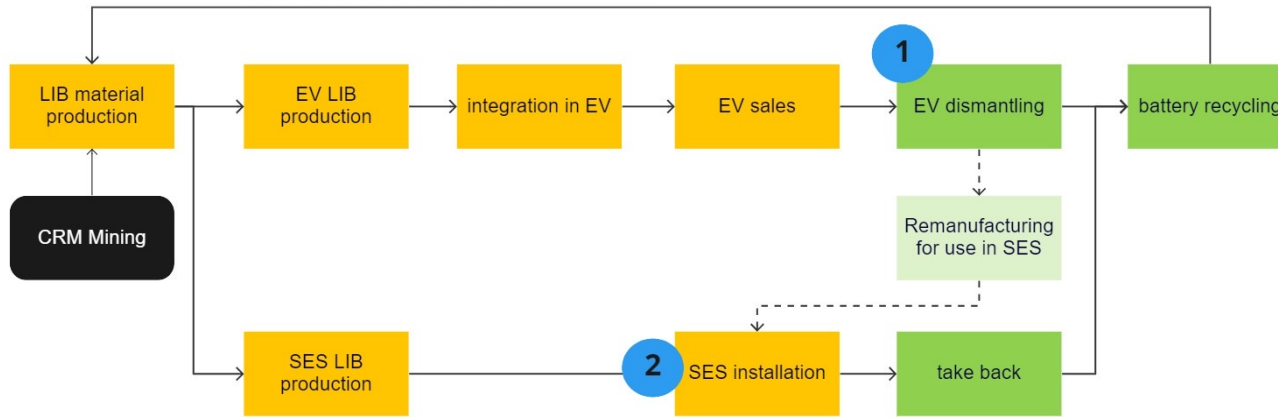
Flanders in the LIB value chain



Next to material recycling, LIB from EV have potential to be remanufactured into stationary energy storage (SES)

Within this landscape, would it be smart to focus on the development of a “Flemish Remanufacturing Hub” for EV LIB?

Scenario analysis



- 1** EV LIB supply: how many, and what kind of, EV LIB will become available in Flanders until 2030?
- 2** SES LIB demand: how many, and what kind of SES LIB will be needed in Flanders until 2030?

miro

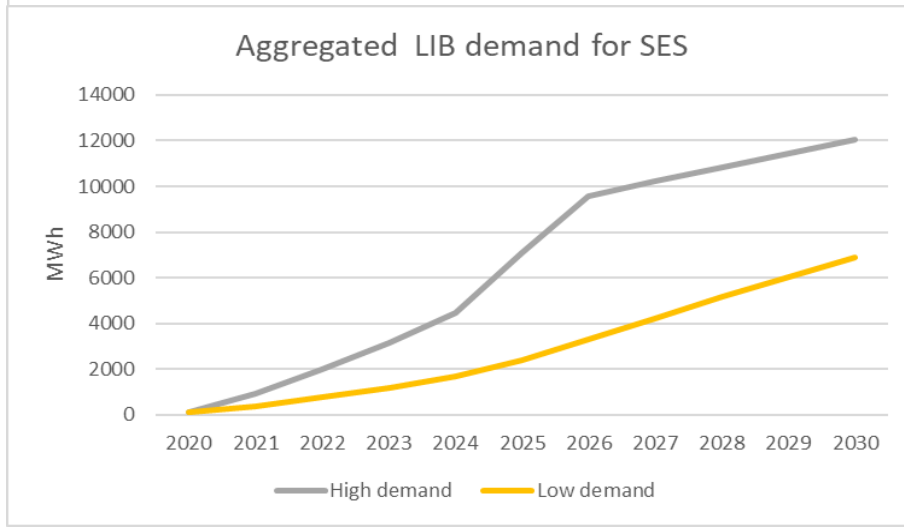
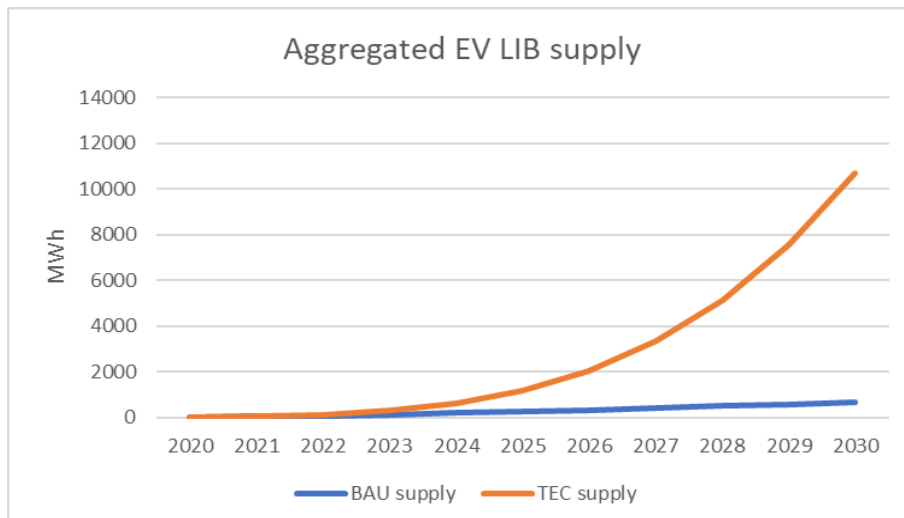
“What-if” scenario-analysis:

Given a number of assumptions about the future, what would the outcome be?

Results

EV LIB supply:

- 2 scenarios based on EV sales and end-of-life trends – Business-as-usual (BAU) and high EV uptake (TEC)
- Supply of EV LIB to remanufacturing depends on LIB age
- Conversion to MWh capacity: LIB mass and capacity based on average values from literature



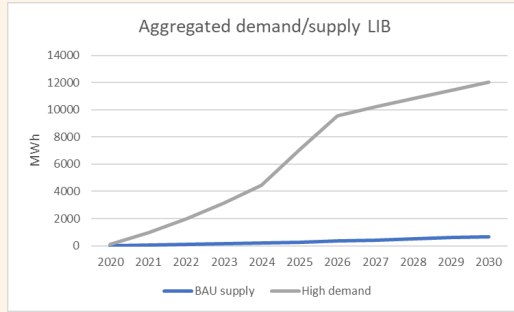
SES LIB demand:

- 2 scenarios based on solar power capacity policy trends for residential and commercial (Flemish Solar Plan), and grid storage (IRENA)
- High demand: optimistic scenario with all PV plants connected to storage by 2030
- Low demand: lower and slower uptake of storage connected to PV storage (49% of retrofit, 80% of new installations by 2030)



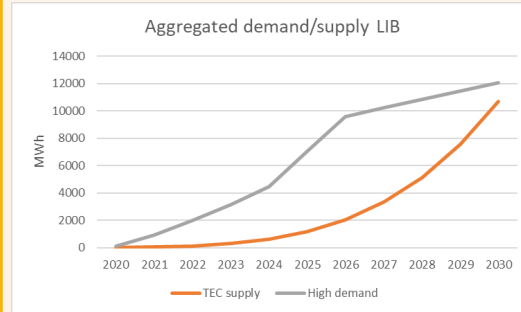
High demand – Low Supply

Supply for remanufacturing too low –
SES market will be saturated with new LIB

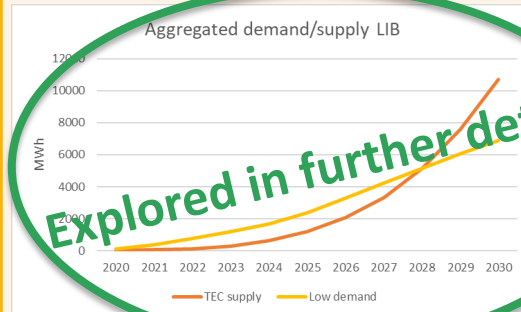
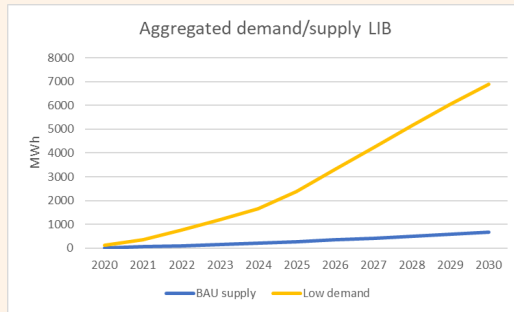


High demand – High Supply

Potential for Remanufacturing Hub in few years time –
Speed of scaling up Remanufacturing Hub is crucial



Supply for remanufacturing too low –
Focus on smaller amount of large scale SES projects?



Largest potential for Remanufacturing Hub if supply of EV LIB and SES demand scale up together

Low demand – Low Supply

Low demand – High Supply

In this future: What could a Remanufacturing Hub deliver by 2030?

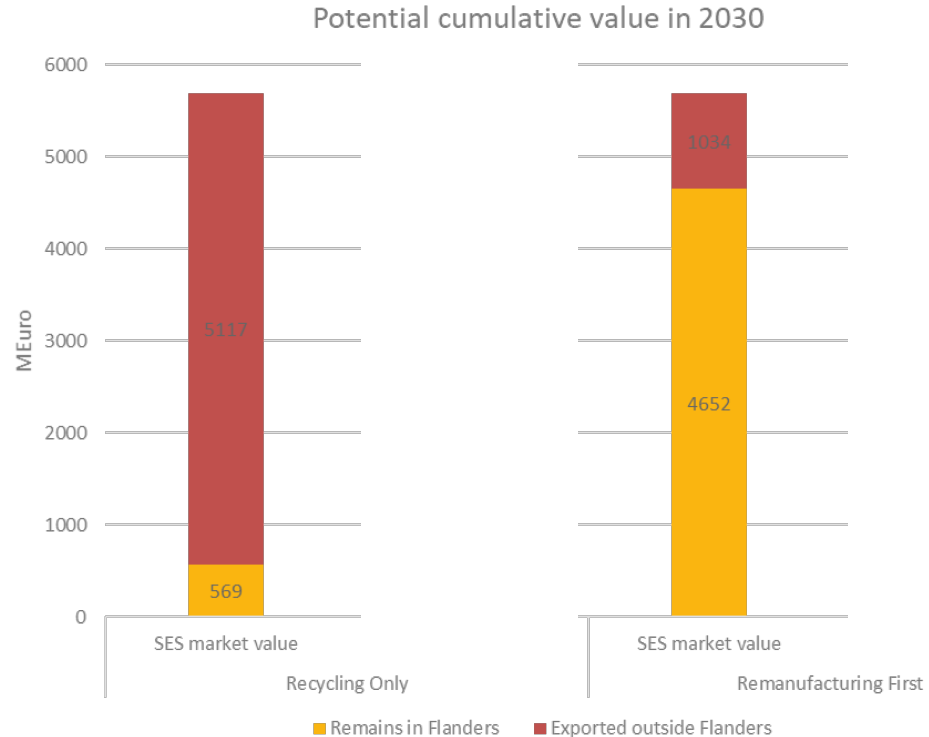


Two scenarios:

- Recycling Only:
 - FL SES market supplied by 'virgin' LIB (imported)
 - EV LIB & SES LIB recycled in Flanders
- Remanufacturing First:
 - FL SES market supplied by remanufactured EV LIB (according to available supply) – rest imported 'virgin' LIB
 - EV LIB & SES LIB recycled in Flanders

Economic value assumptions:

- SES LIB market:
 - Assumed market price of SES pack (incl. installation) 1000 € /kWh in 2020, decreasing to 720 € /kWh in 2030
 - 10% of market price related to installation (remains in Flanders)
 - Rest of market price only remains in Flanders for remanufactured LIB
- Recycling:
 - material market prices for Ni, Li, Co, Cu, Graphite as proxy to estimate potential value before recycling
 - Value remains in Flanders



Case study conclusions



If the future would follow the assumptions in this scenario, EV LIB remanufacturing in Flanders would provide

- A significant opportunity to create local economic value
- Environmental impact savings due to avoided SES LIB production
- Increased quality of material input to recycling (NMC from EV LIB vs LFP from virgin SES LIB)

But the real question is: how will the future develop?

Start with strategic stock monitoring

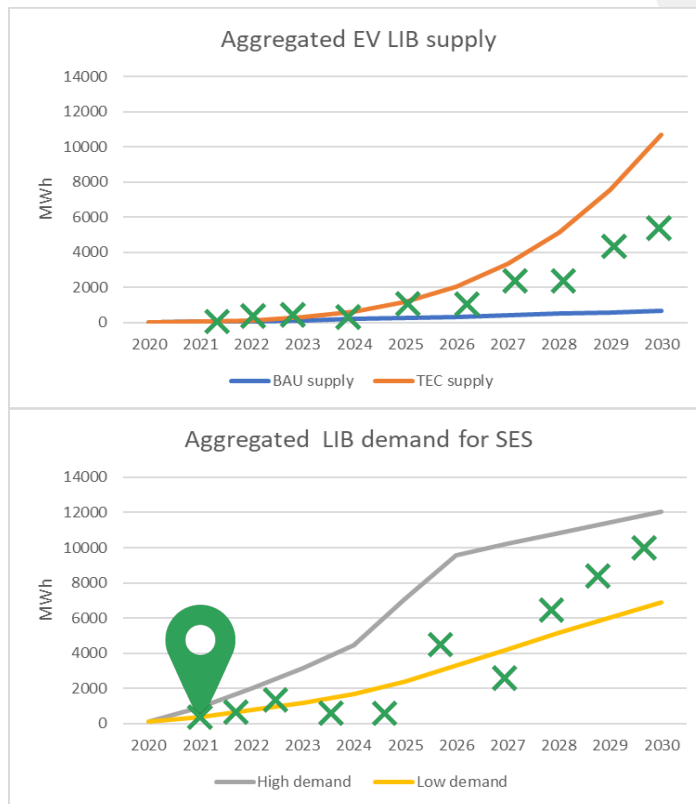


For this case:

- Monitor and forecast future LIB supply:
 - EV sales and EOL evolution + battery types used
- Monitor and forecast future SES demand:
 - demand evolution from registered installations
- Use these insights to plan investments and policy measures

In general: in-use product stocks are the strategic resources for Flanders!

➔ Decide for which other sectors/product value chains strategic stock management is relevant as well, and develop capacity and tools to start monitoring





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Questions?

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