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Resource Strategies for EV Batteries




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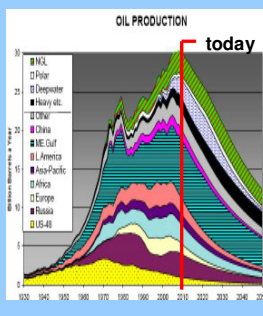
Main messages

- EV batteries are complex systems in terms of the elements contained, and thus highly exposed to materials risk
Li, Cu, Mn, Ni, Co, Al, RRE ...
- These risks are multi-faceted
regulation, availability, costs
- Resource strategies to counter these risks are thus needed at technical, purchasing and public action levels
- Recycling will not be sufficient to meet demand
need a strong framework of LCA and stocks & flows
- Our interest & action must radiate up & downstream, worldwide
corporate/public R&D, global sourcing & production, life-cycle schemes

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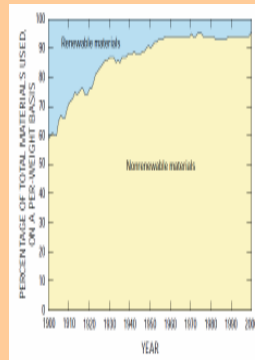
The future of our business is linked to resources

Energy




Source: Petroconsultats, Materials in the economy, USGS 1221-508 (2002), & UNEP

Minerals



Water




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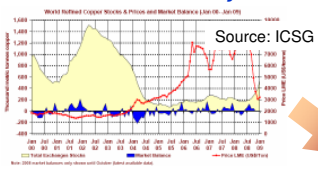
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The context is putting pressure on materials

Resources

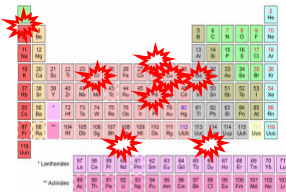
- Strategic metals & elements
- Limits on availability



Source: ICSG

Rapidly evolving technologies

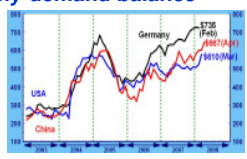
- New demand for materials
- Constraints on production capacities



MATERIALS

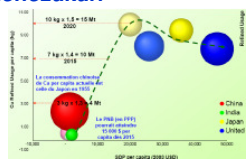
Materials price instability

- Speculative markets
- Supply-demand balance



Competitive international context

- China & India
- Monozukuri




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Hot spots of our materials security

- **China & India**, and to some extent Russia will be major market drivers influencing materials availability & price
- Mining countries are realizing and setting up to use their **geopolitical leverage**; also, **corporate concentration** effects are increasing
- **New technologies** will create temporary but sudden shifts in demand
- **Costs linked to energy** and **externalities such as water & environmental** (incl. CO₂) **taxes** throughout the materials supply chain are on the verge of increasing drastically & will become a major constraining factor
- **Other national & regional governments** are moving faster /stronger than the **EC** on their Raw Materials initiatives & policies

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CHANGEMENTS ET DÉVELOPPEMENTS DURABLES



Our product strategy – such as Renault EV – can not be dissociated from a resource security strategy



Renault, a people-centric and innovative Company, offering sustainable mobility for all

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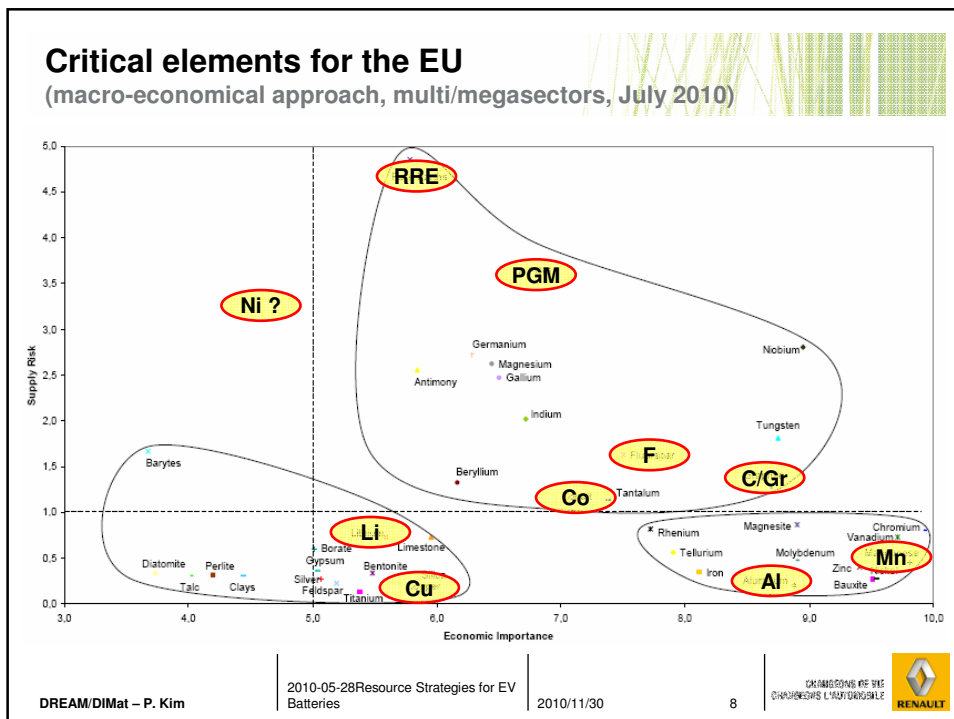
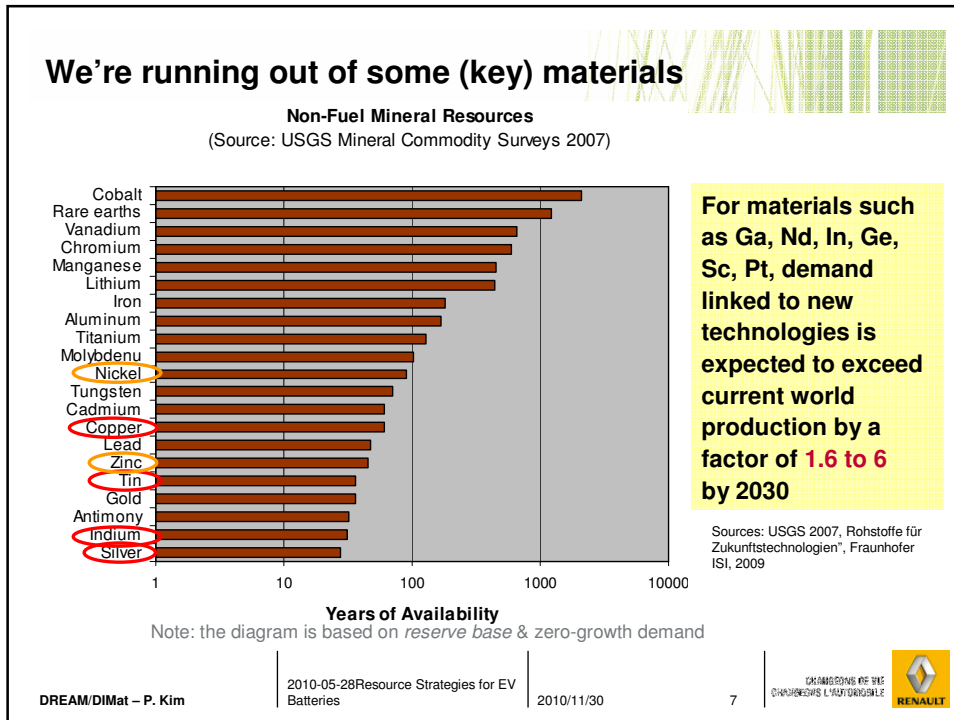
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CHANGEMENTS ET DÉVELOPPEMENTS DURABLES






Criticality analysis & consequences

- Speculative price impacts
- Production bottlenecks
- Trade restrictions
- Externalities (resources, emissions)
- Limits of availability

- Cost of business, COP
- Production continuity
- Geographic availability
- Reduce the footprints
- Need for substitution


Solutions

- Technology choice based on stronger R&AE and resource intelligence
 - LCA-based technical strategies for improved materials efficiency
 - Global design of our sourcing / supply chain
 - Reinforced involvement in recycling


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Conclusions & recommendations

- Know & control materials costs & risks (3 Rs, substitution & diversification) within a context of competition on the materials market
- Reinforce corporate as well as government R&D to improve performance for materials efficiency
- Develop integrated downstream business concepts, and launch stronger industry partnerships, with a more pronounced long-term component
- Recycling schemes must be considered in the framework of LCA and stocks & flows– but **recycling will not be sufficient to meet demand**
- Know the environmental impacts and factor externalities into the evaluation of future cost evolutions

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Thank you for your attention



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CHANGEMENTS EN MOBILITÉ

