



Swiss Centre for Life Cycle Inventories

A joint initiative of the
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Federal Offices

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ART

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metals:

Gold & Silver

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Agenda

- Overview global gold and silver production
- Structure of the datasets
- Gold mining in Peru
- Secondary gold production
- Key figures
- Comparison of different datasets

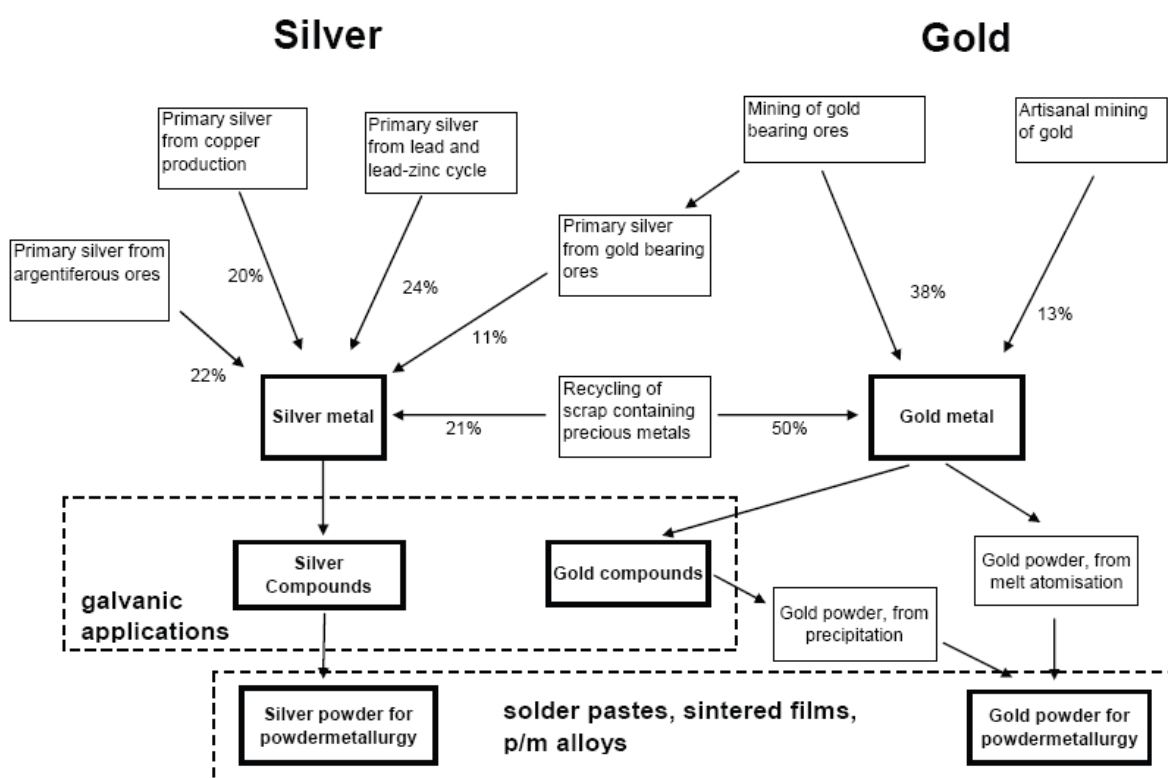


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Overview Gold & Silver production

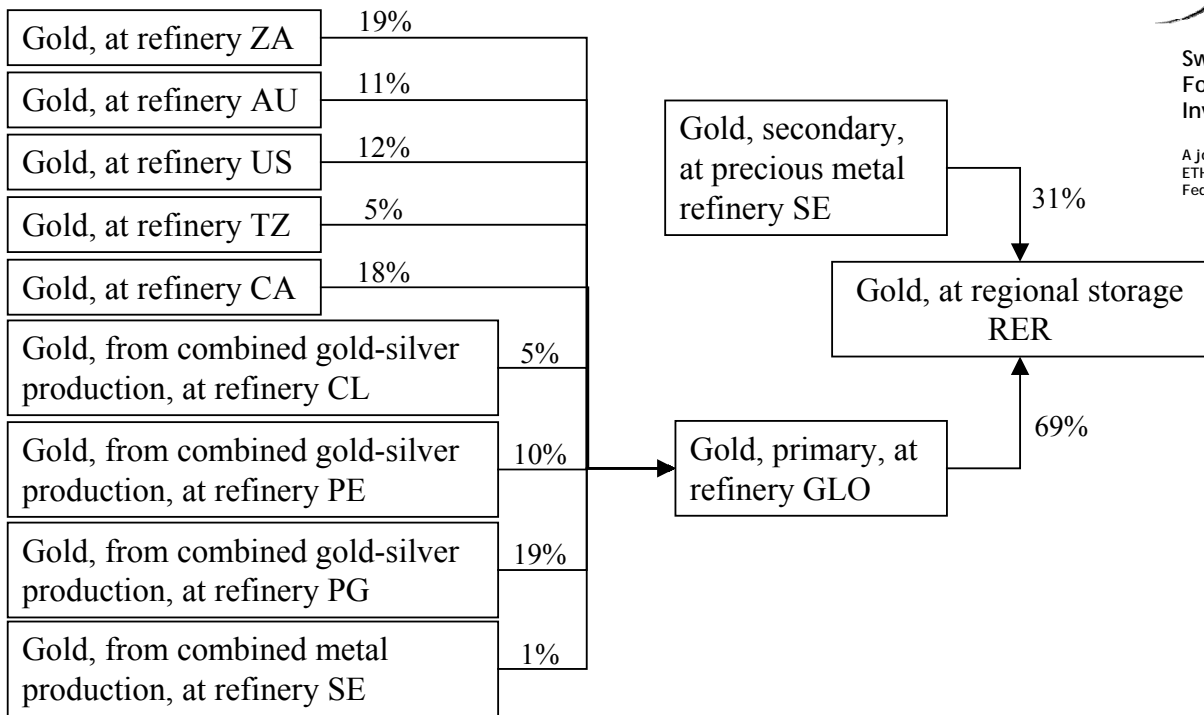


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Overview - Gold

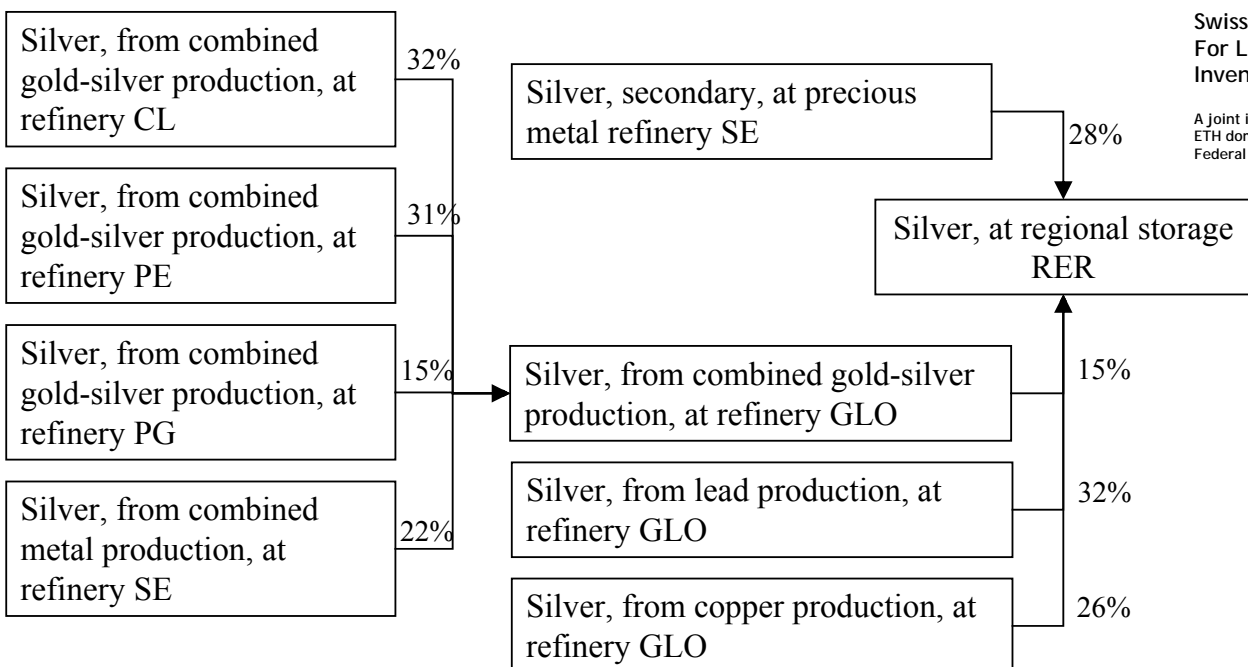


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Overview - Silver



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Modelling and Data Sources



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- Economic allocation (metal multi-output processes)
- Primary Gold and Silver:
 - Mining infrastructure
 - Mining
 - Refining
- Data for primary metal production and are based on environmental reports
- Data for secondary metal production and silver from copper and lead production are based on industry and literature data



Gold mining in Peru



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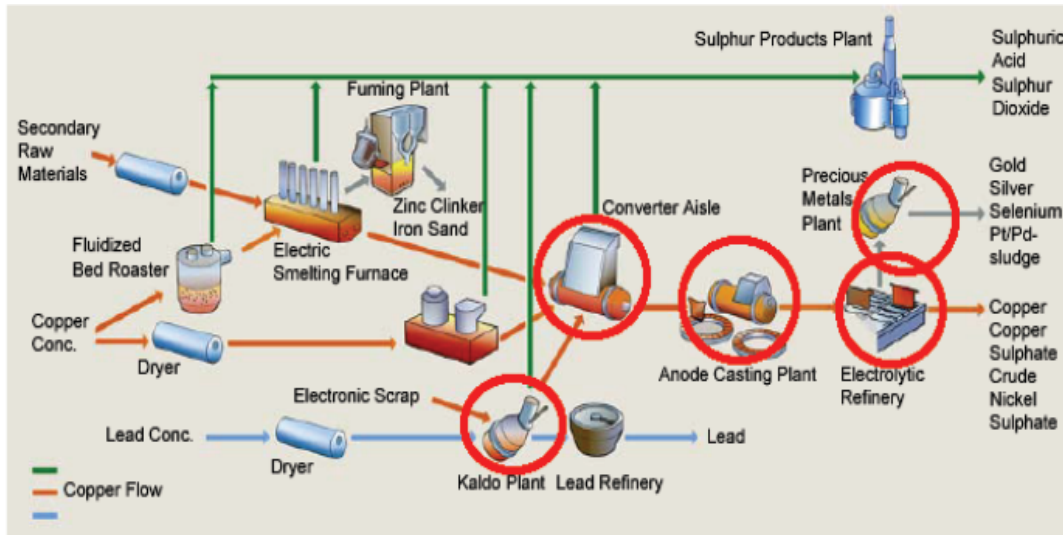
Secondary Gold



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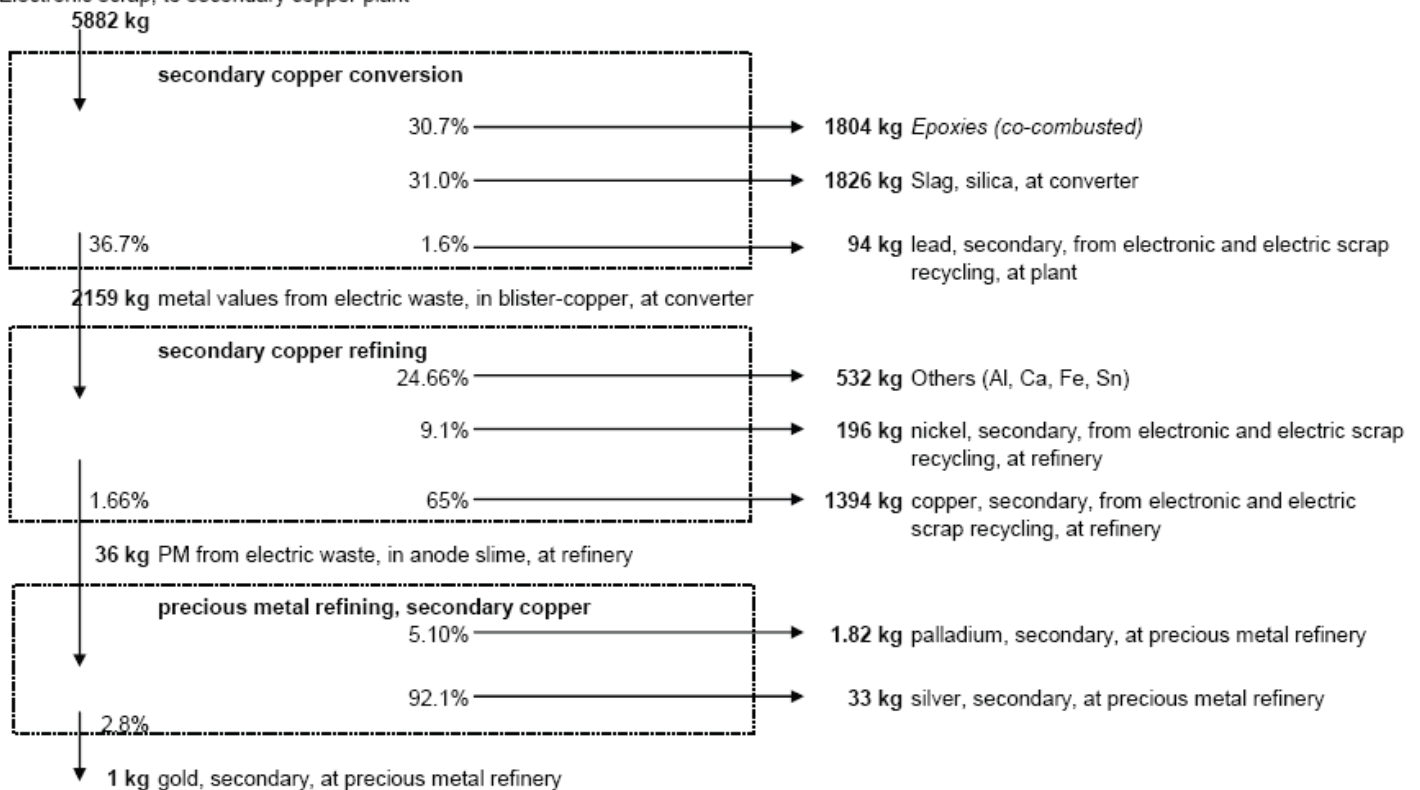
- Pyrometallurgical recovery of electronic scrap



Secondary Gold



Electronic scrap, to secondary copper plant



Key figures



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Gold	Unit	Primary	Secondary
Electricity	kWh/kg	3'264 - 32'603	19.3
Fossil Fuels	MJ/kg	76 - 262'729	2.6
Diesel (building machines)	MJ/kg	3'386 - 152'200	
Concentration	g/t	0.2 - 7.5	490

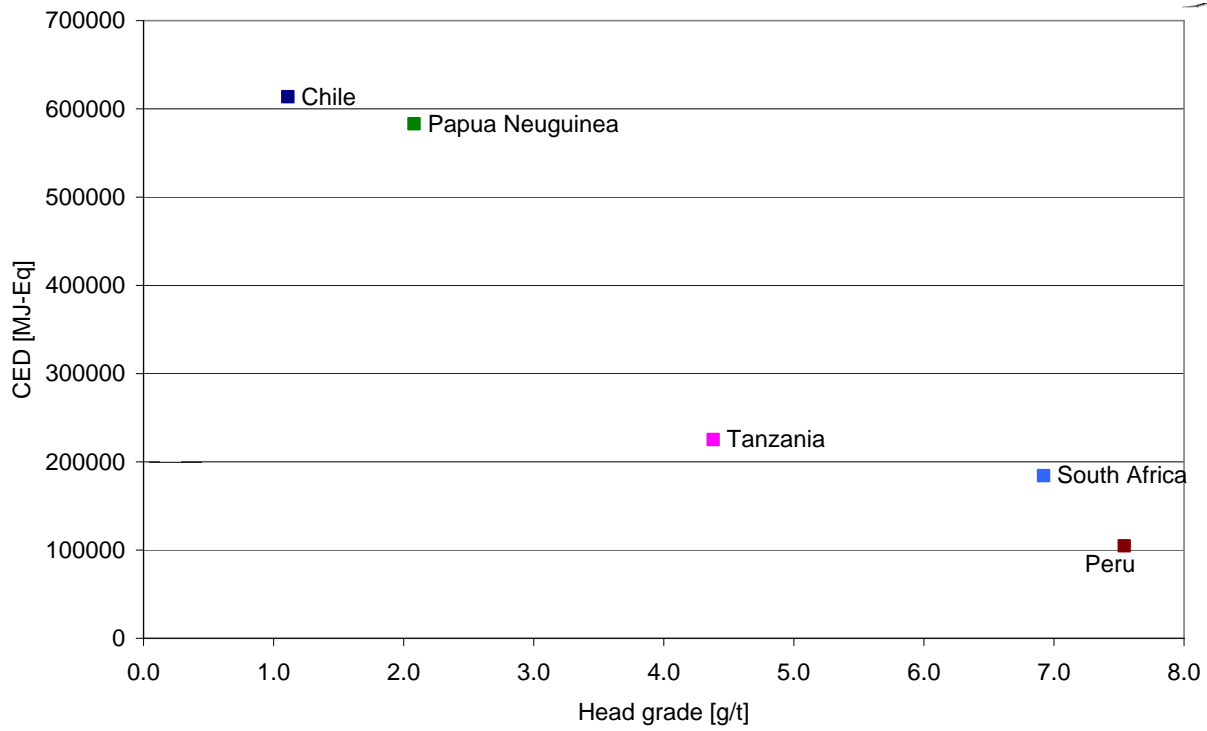
Silver	Unit	From combined s-g	From lead	From copper	Secondary
Electricity	kWh/kg	54 - 559	1.5	6.6	0.33
Fossil Fuels	MJ/kg	1 - 6'345	0.2		0.04
Diesel (building machines)	MJ/kg	58 - 3'676			
Concentration	g/t	0.5 - 41.6			5'600

Key figures

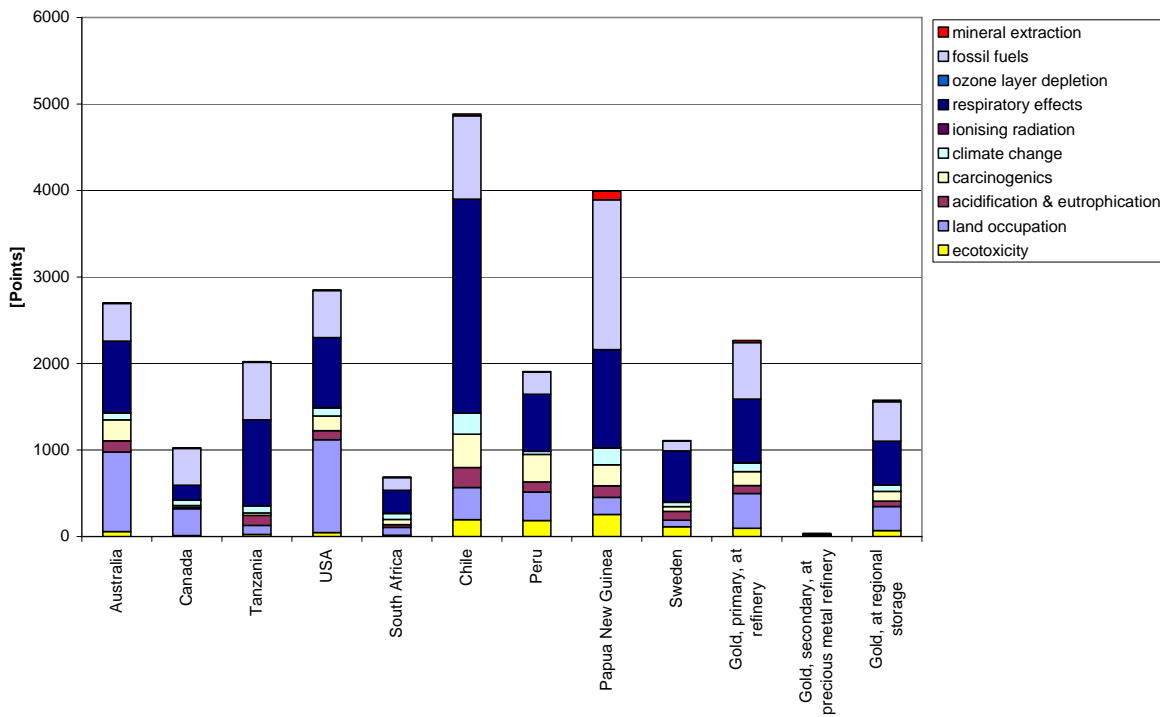


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Ecoindicator 99 - Gold production

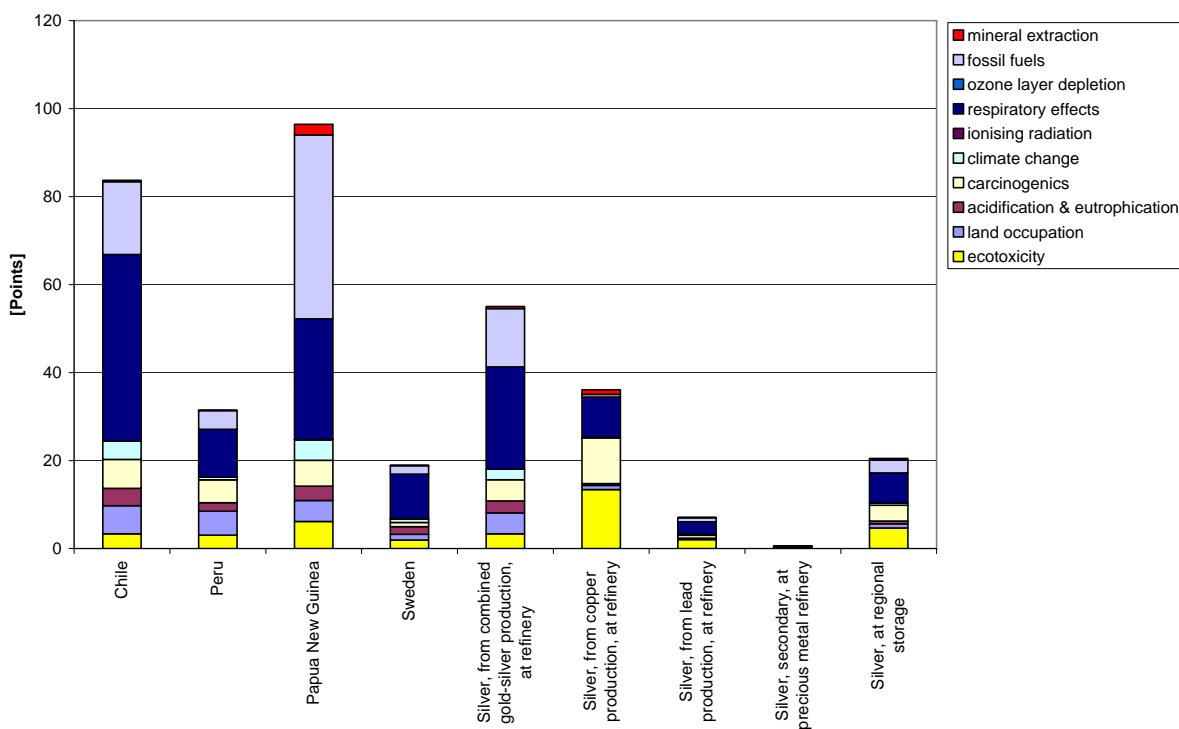


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Ecoindicator 99 - Silver production



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Conclusion

- Datasets are meant to be used as background datasets
- Best practices for gold mining → underestimation
- Good data quality with respect to energy, cyanide and explosive consumption
- Data for water/air emissions are based on older environmental reports
- Differences between countries → based on technologies, head grade and assumptions made for emissions



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