



Environmental Goods

Summary – Non-Paper for TESSD

United Kingdom
Department for Business and Trade
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Key messages

1. EGS deep dive discussions in 2023 provide an important opportunity to **build a shared understanding** of:
 - a) Which goods will be most important to help us achieve environmental objectives and what services enable them
 - b) What barriers are limiting trade in these goods, and
 - c) What steps can be taken to increase trade in these goods
2. **Value chain analysis** can provide a powerful way to explore these questions because it provides a **unifying conceptual framework** for understanding a wide array of policy issues relating to EGS.
3. We should **build and maintain a living summary document**, organised clearly against the three questions proposed above and serving as a reference of discussions for all members.

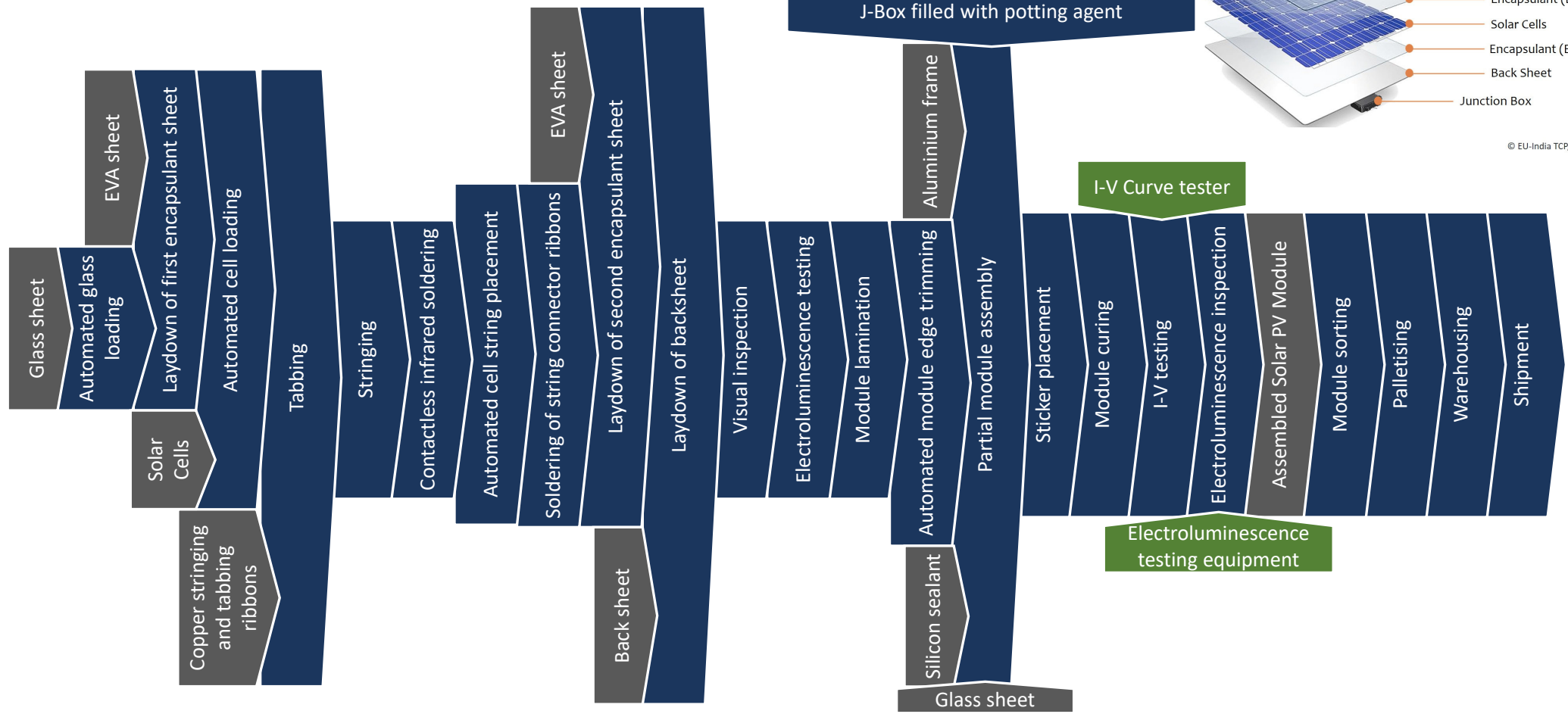


Building evidence using value chain analysis

- **Value chain analysis** is useful for assessing the relationships between trade, production, and the environment for key environmental technologies.
- **Value chain diagrams** visualise both goods and services, production of and trade in technologies. They describe *what* is involved in the creation of final products, and *how* this happens.
- Producing value chain diagrams helps to **drive research into connected problems associated with these technologies**, which can be annotated onto the diagrams. Our research has explored issues such as:
 - classification challenges
 - lifecycle issues
 - environmental and economic interests of countries on different development pathways
 - links between goods and services
 - where and how non-tariff measures apply
 - opportunities for voluntary technology transfer on mutually agreed terms.

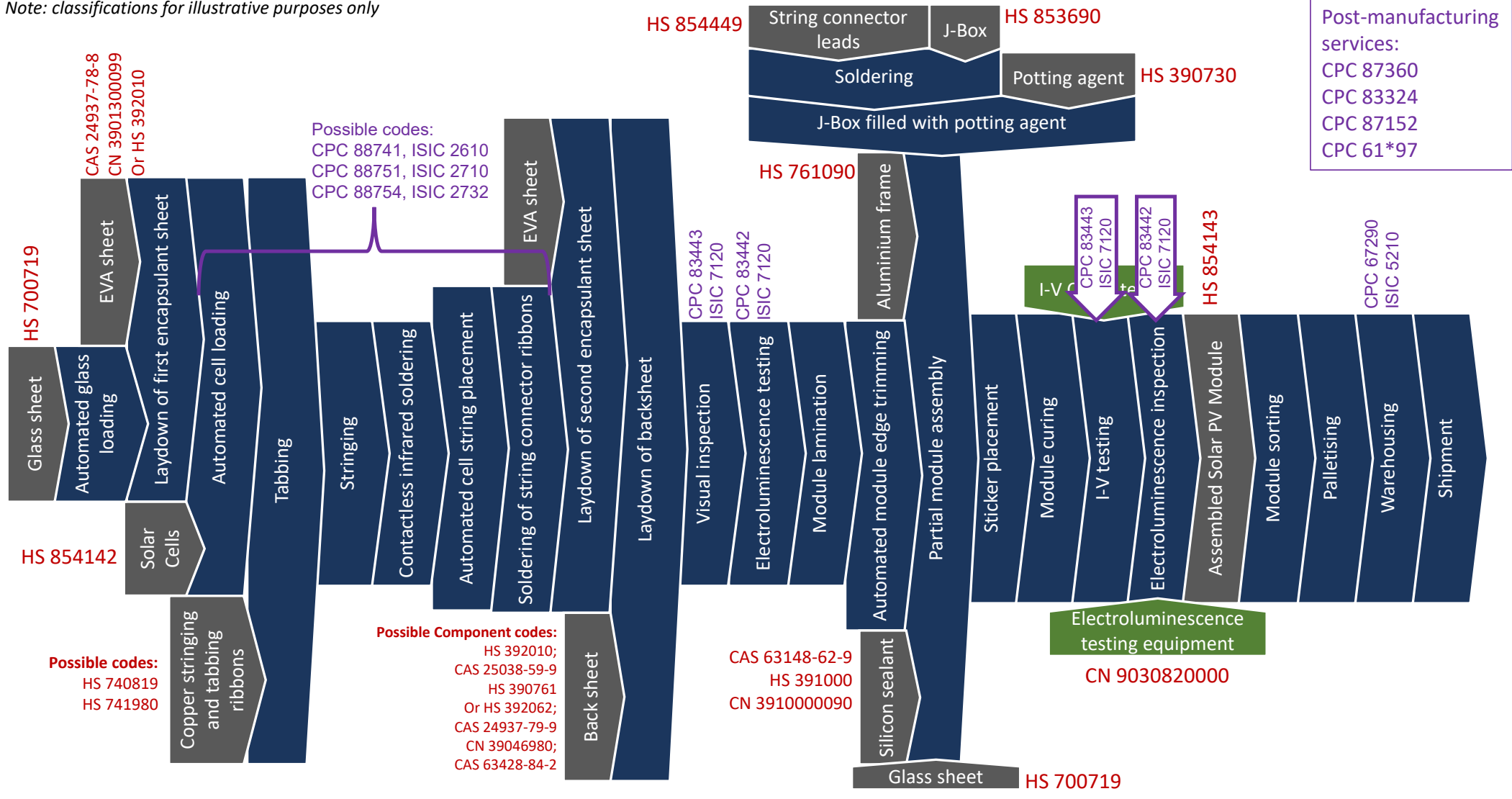
Note: the full set of value chain diagrams for Solar PV will be circulated in the non-paper

Final assembly stages for a Solar Photovoltaic (PV) Module



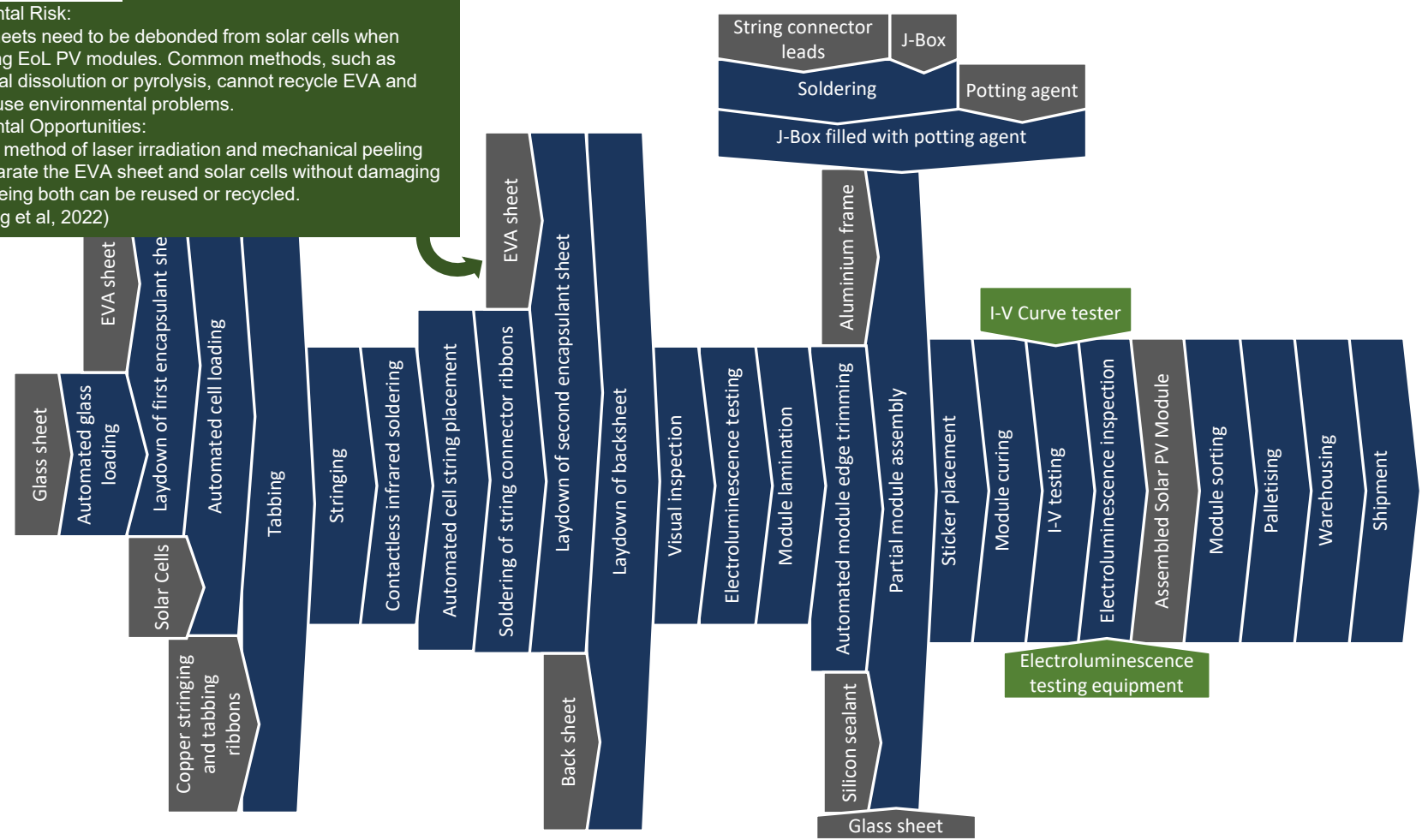
Final assembly stages for a Solar Photovoltaic (PV) Module – HS & CPC Annotative Layer

Note: classifications for illustrative purposes only

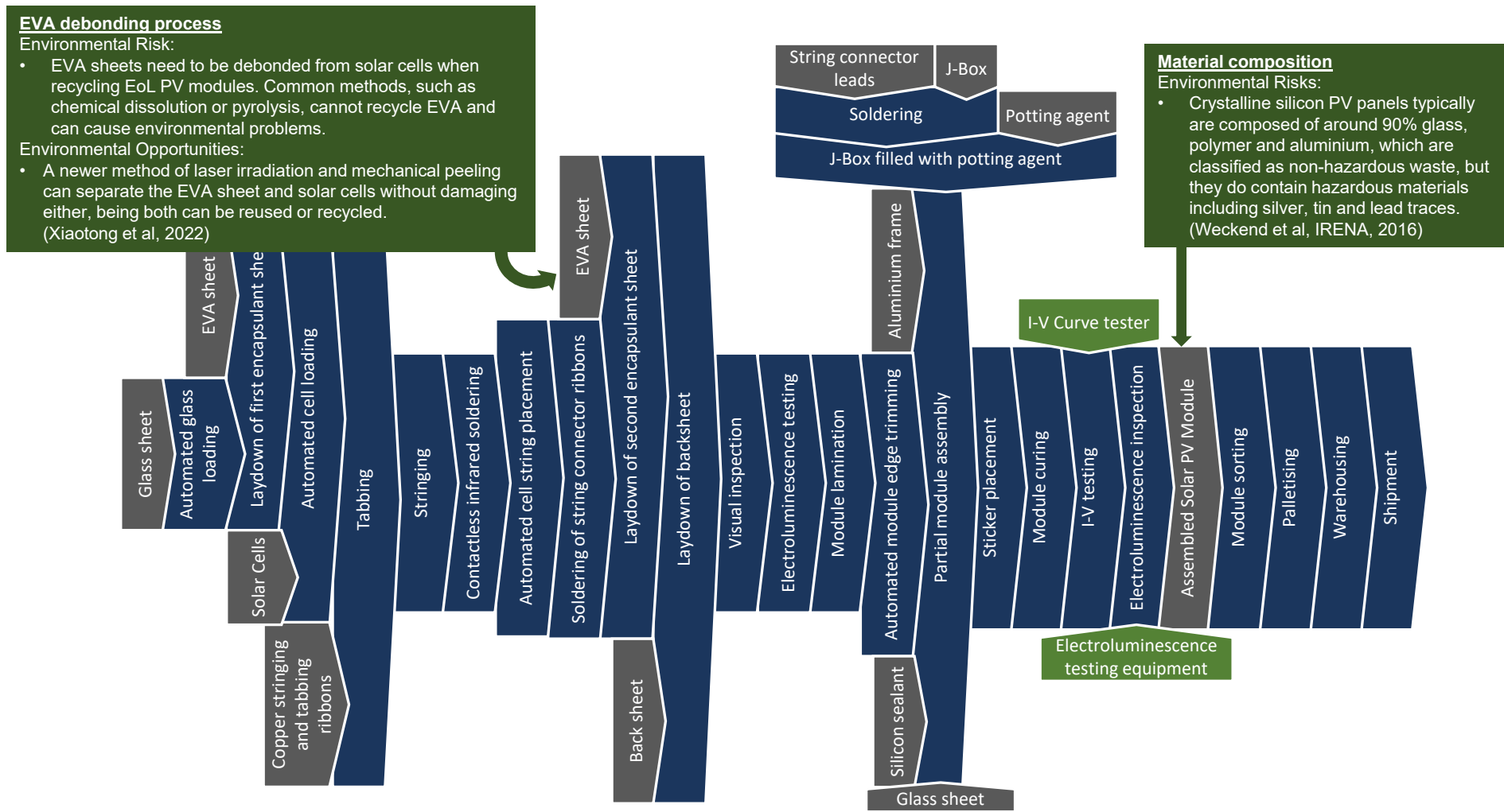


Final assembly stages for a Solar Photovoltaic (PV) Module – Lifecycle Risks & Opportunities Annotative Layer

EVA debonding process
 Environmental Risk:
 • EVA sheets need to be debonded from solar cells when recycling EoL PV modules. Common methods, such as chemical dissolution or pyrolysis, cannot recycle EVA and can cause environmental problems.
 Environmental Opportunities:
 • A newer method of laser irradiation and mechanical peeling can separate the EVA sheet and solar cells without damaging either, being both can be reused or recycled. (Xiaotong et al, 2022)



Final assembly stages for a Solar Photovoltaic (PV) Module – Lifecycle Risks & Opportunities Annotative Layer

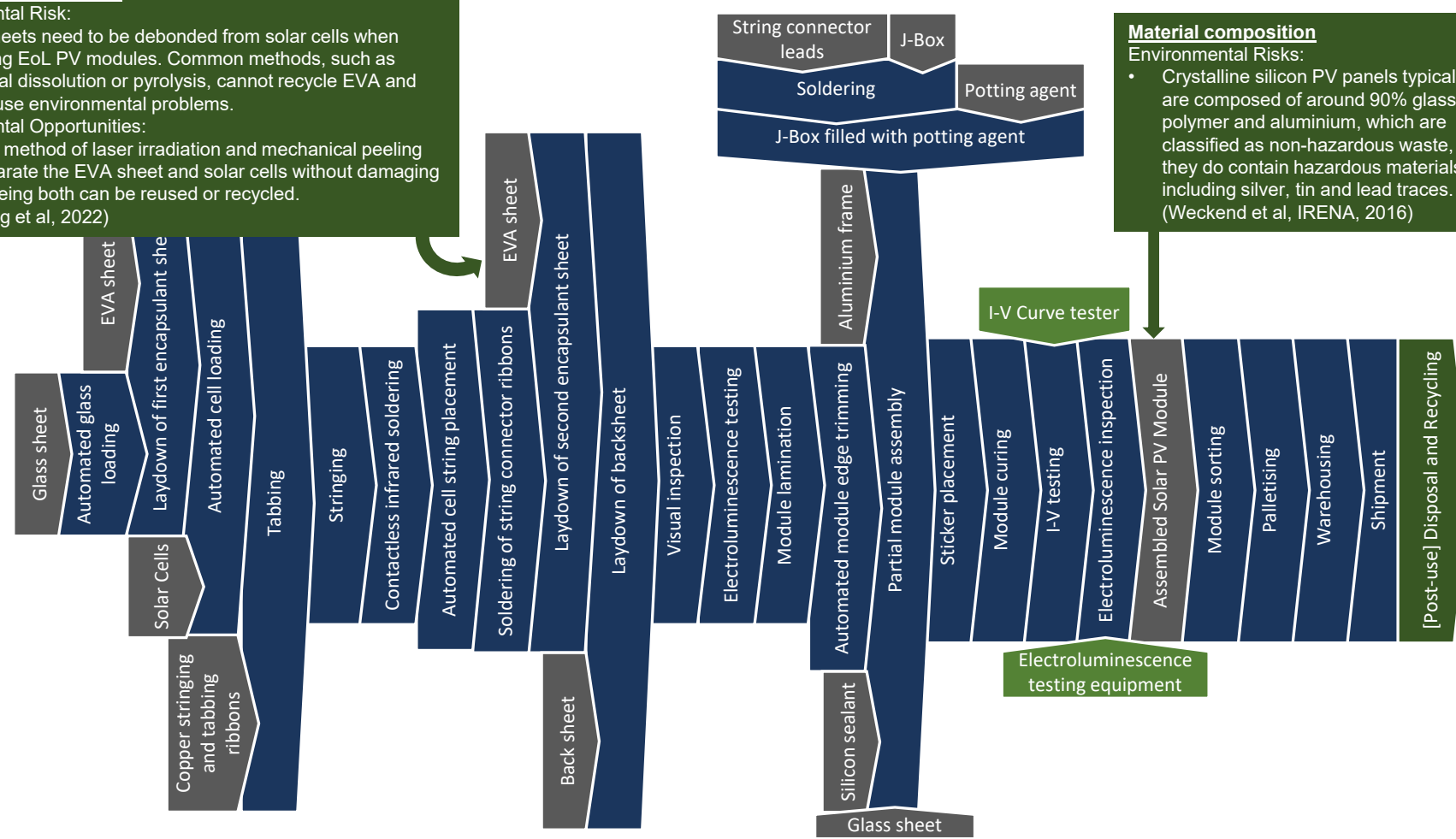


Final assembly stages for a Solar Photovoltaic (PV) Module – Lifecycle Risks & Opportunities Annotative Layer

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Material composition
 Environmental Risks:
 • Crystalline silicon PV panels typically are composed of around 90% glass, polymer and aluminium, which are classified as non-hazardous waste, but they do contain hazardous materials including silver, tin and lead traces. (Weckend et al, IRENA, 2016)

End-of-life processing
 Environmental Opportunities:
 • 95% of materials in PV modules are recyclable. (U.S. Department of Energy, 2022)
 Environmental Risks:
 • Cost or recycling end-of-life PV modules is \$15-\$45 per module, compared with landfill costs of \$1-\$5 per module. (U.S. Department of Energy, 2022)



Final assembly stages for a Solar Photovoltaic (PV) Module – Lifecycle Risks & Opportunities Annotative Layer

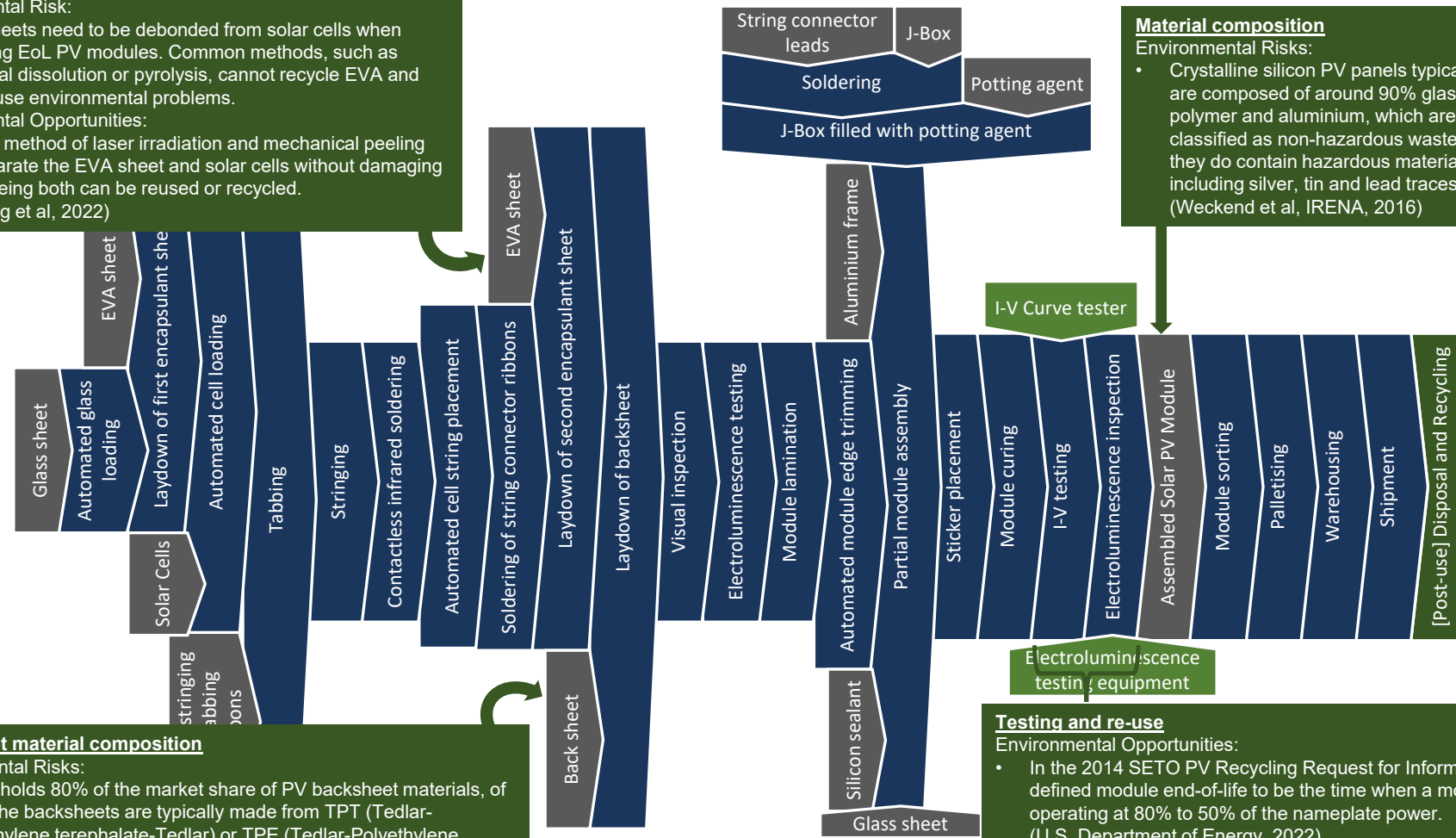
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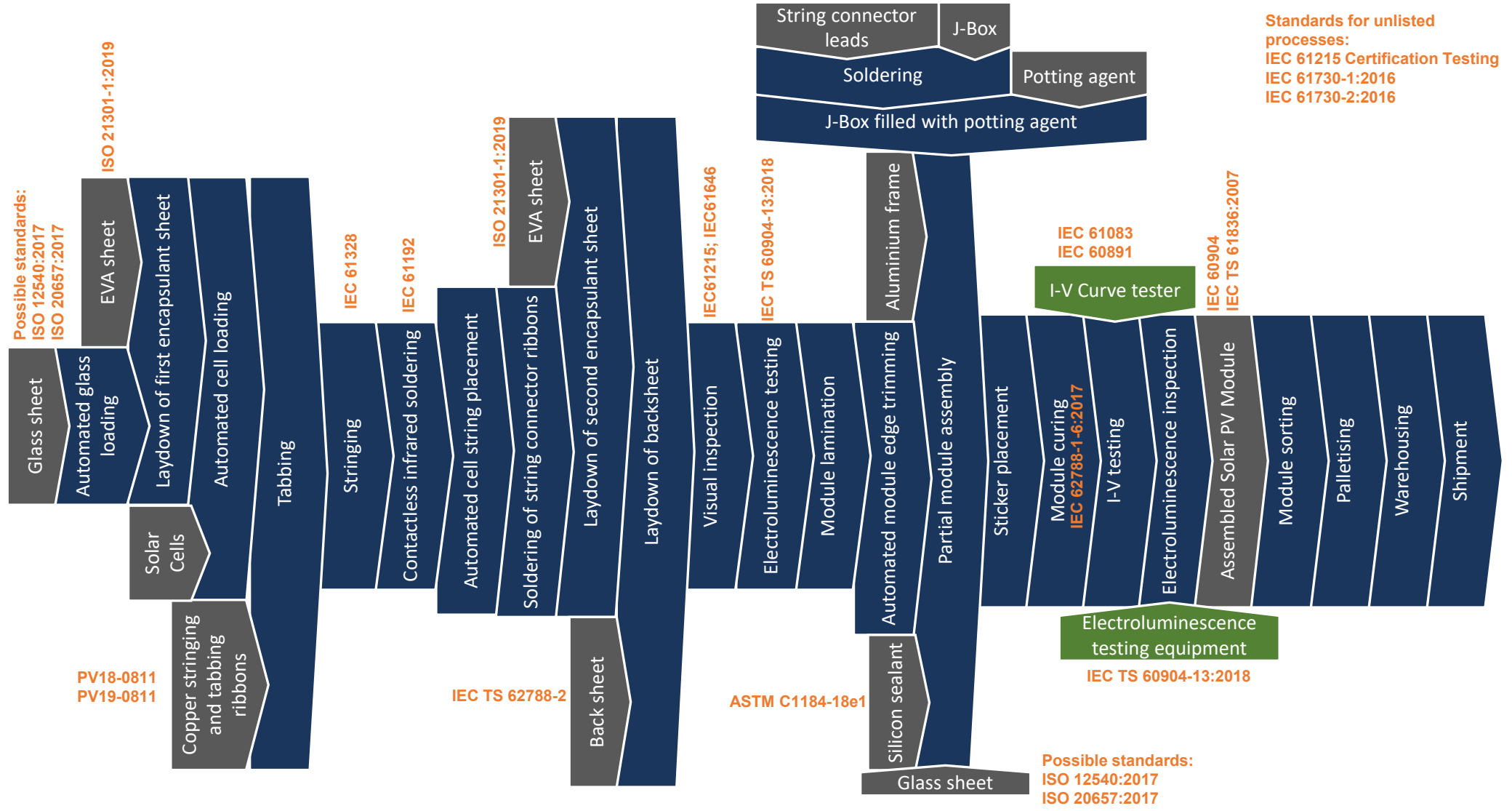
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Back sheet material composition
 Environmental Risks:
 • Tedlar holds 80% of the market share of PV backsheet materials, of these the backsheets are typically made from TPT (Tedlar-Polyethylene terephthalate-Tedlar) or TPE (Tedlar-Polyethylene Terephthalate-Ethylene Vinyl Acetate) (Farrell, Osman, Zhang, et al. 2019). Tedlar is polyvinyl fluoride, the thermal recycling of which is incredibly toxic (Gifford, 2015).

Testing and re-use
 Environmental Opportunities:
 • In the 2014 SETO PV Recycling Request for Information (RFI), respondents defined module end-of-life to be the time when a module is tested as operating at 80% to 50% of the nameplate power. (U.S. Department of Energy, 2022)
 • Many PV modules can still produce electricity when they are retired — there is a growing industry of selling retired modules on to secondary users, that would in many cases go to landfill.



Final assembly stages for a Solar Photovoltaic (PV) Module – Standards Annotative Layer





Final Conclusion

1. Conducting **value chain analysis** for environmental goods in this style is **useful for supporting better coordination of trade, industrial, and environmental policies.**
2. The relationship between these areas is complex, but **policies in this space must be evidence-led.** This approach is a relatively **neat way of organising complex information** in a **digestible and accessible format** that **everyone** can contribute to.
3. **All levels of contribution can be incorporated into this framework.** We encourage everyone to **work collaboratively to bring this evidence base together** and to draw from this to develop a **living summary document.**

Please consider our guiding questions in the summary paper for future sessions this year.