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## **Energy transition , solar PV and circular economy : triple helix approach to a second life for PV modules in chile**

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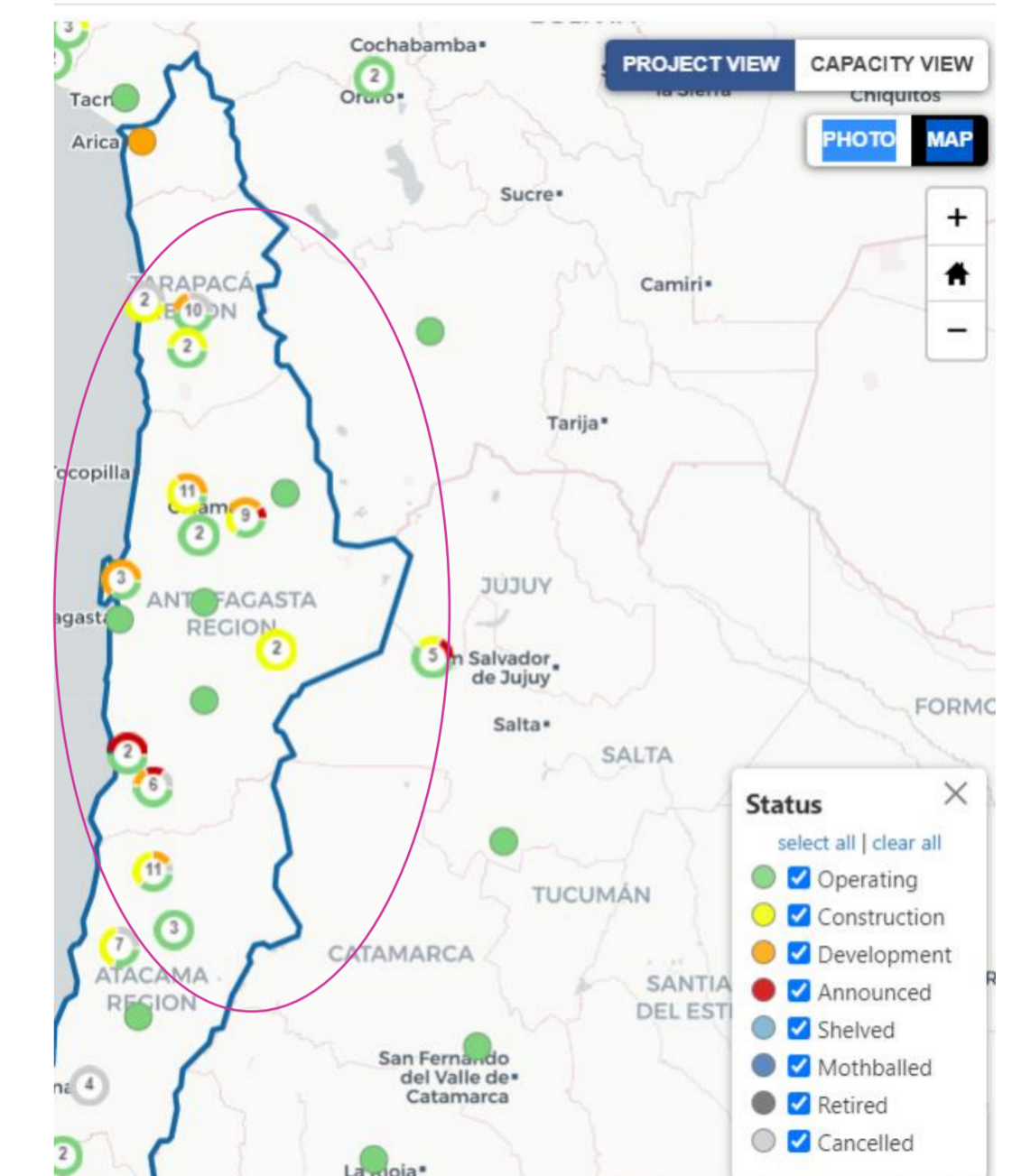
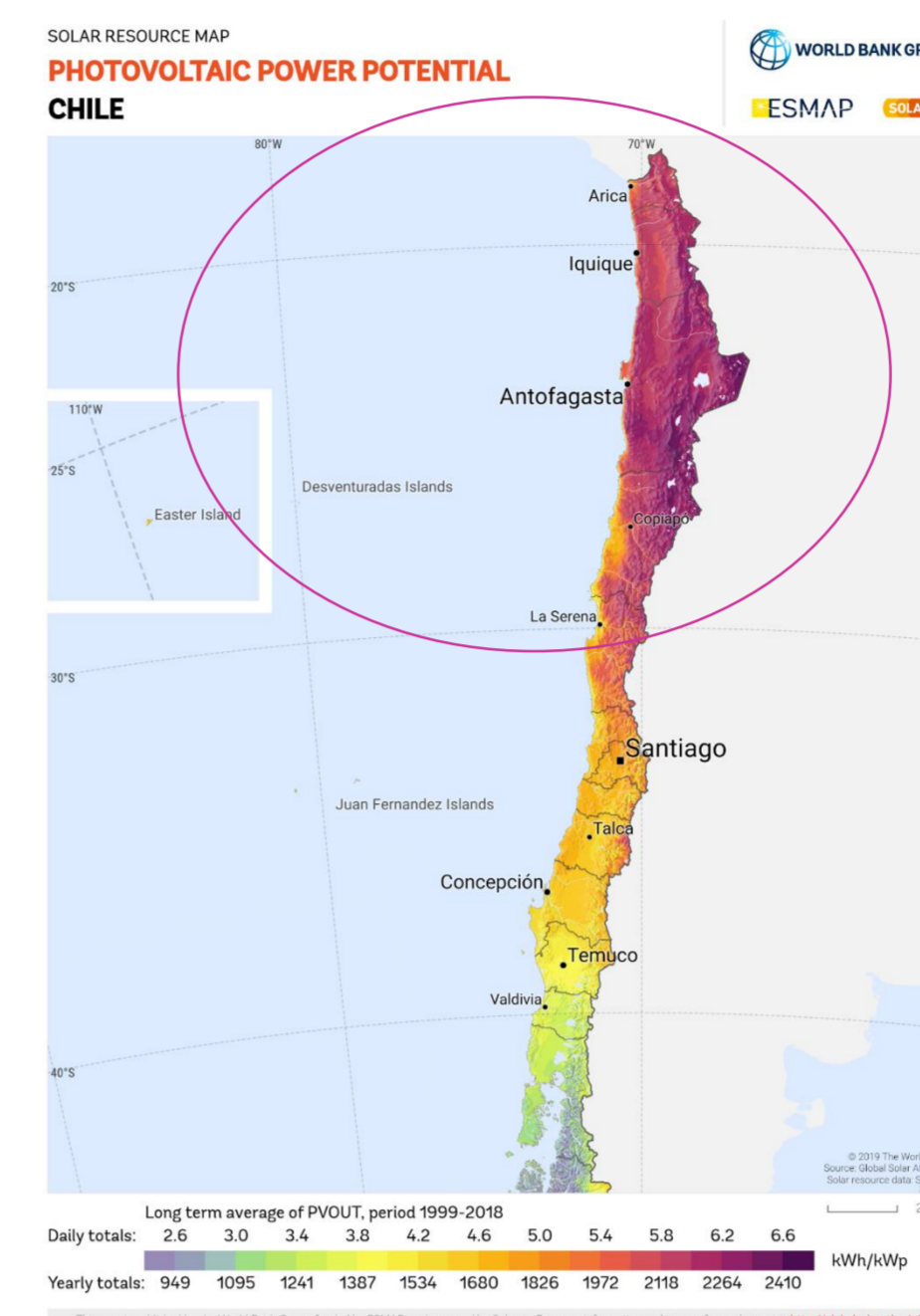
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# Energy Transition, Solar PV and Circular Economy: triple helix approach to a Second Life for PV Modules in Chile

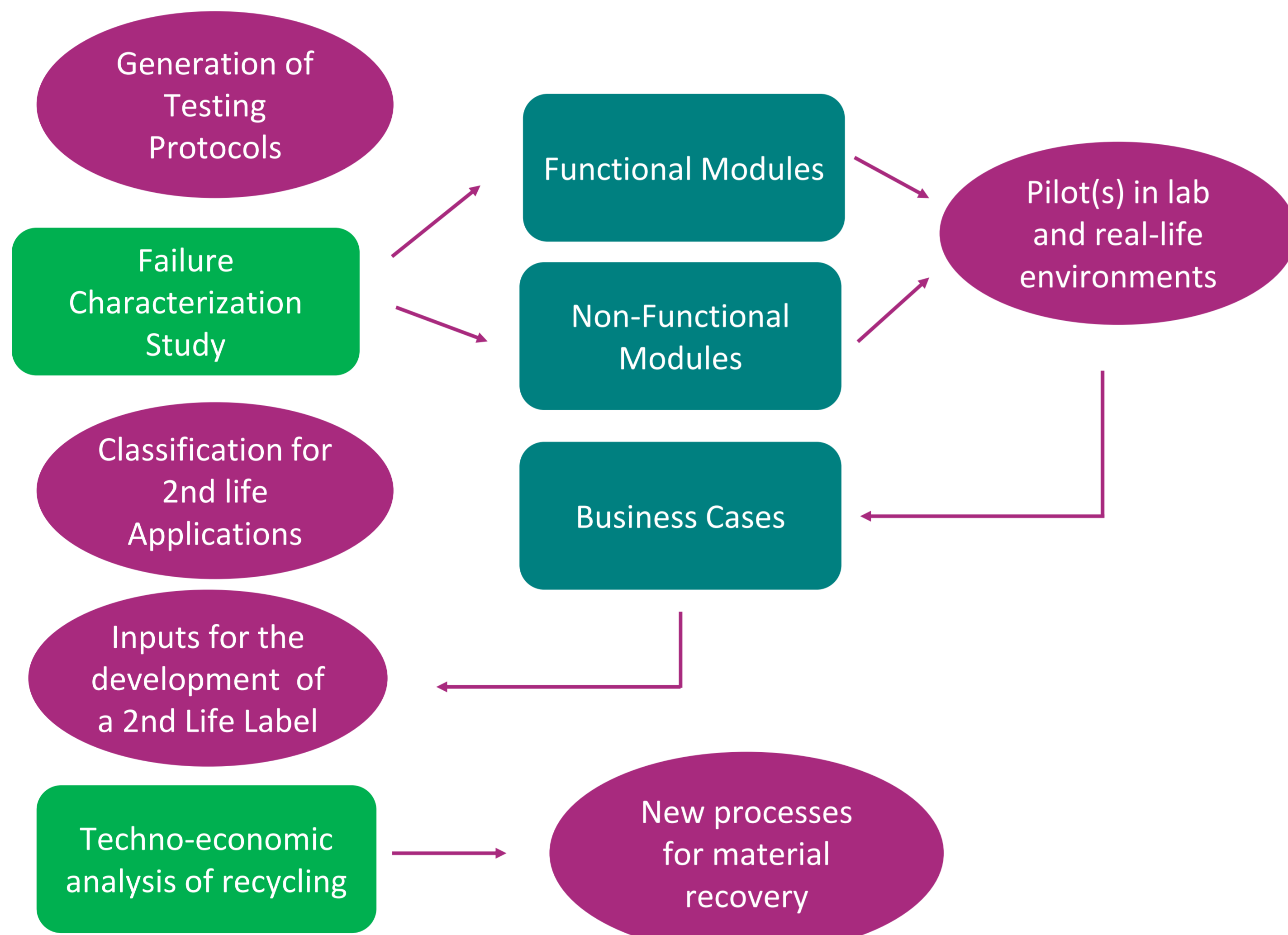
Authors: Maria Jose Riquelme, Denet Soler, PhD Delfina Muñoz, Nouha Gazbour, PhD Jorge Rabanal-Arabach, PhD Edward Fuentealba, PhD Ingrid Jamett, PhD Yecid Jiménez, Natalia Reyes.

## 1. CONTEXT

- According to a recent study by RIGK and In-Data for the Ministry of Energy, there will be between 161 million and 270 million PVM in the country by 2050. Considering their useful life, the first major end-of-life waste peak will be in 2046, with 120,000 tonnes.
- Most projects will be in the north of Chile, in a desert and high radiation environment.
- Industrial recycling requires a large number of modules, energy-efficient and sustainable technologies.
- According to the study, the most cost-effective method is to collect reusable modules at the dismantling site, with sorting, visual and electrical testing and documentation performed directly upon removal. Chile lacks the infrastructure to carry out this service.
- PVM testing and classification must be standardised so that they can be safely reused.
- The industry does not have data on the number of decommissioned modules, their condition, failure rates, materials and components.



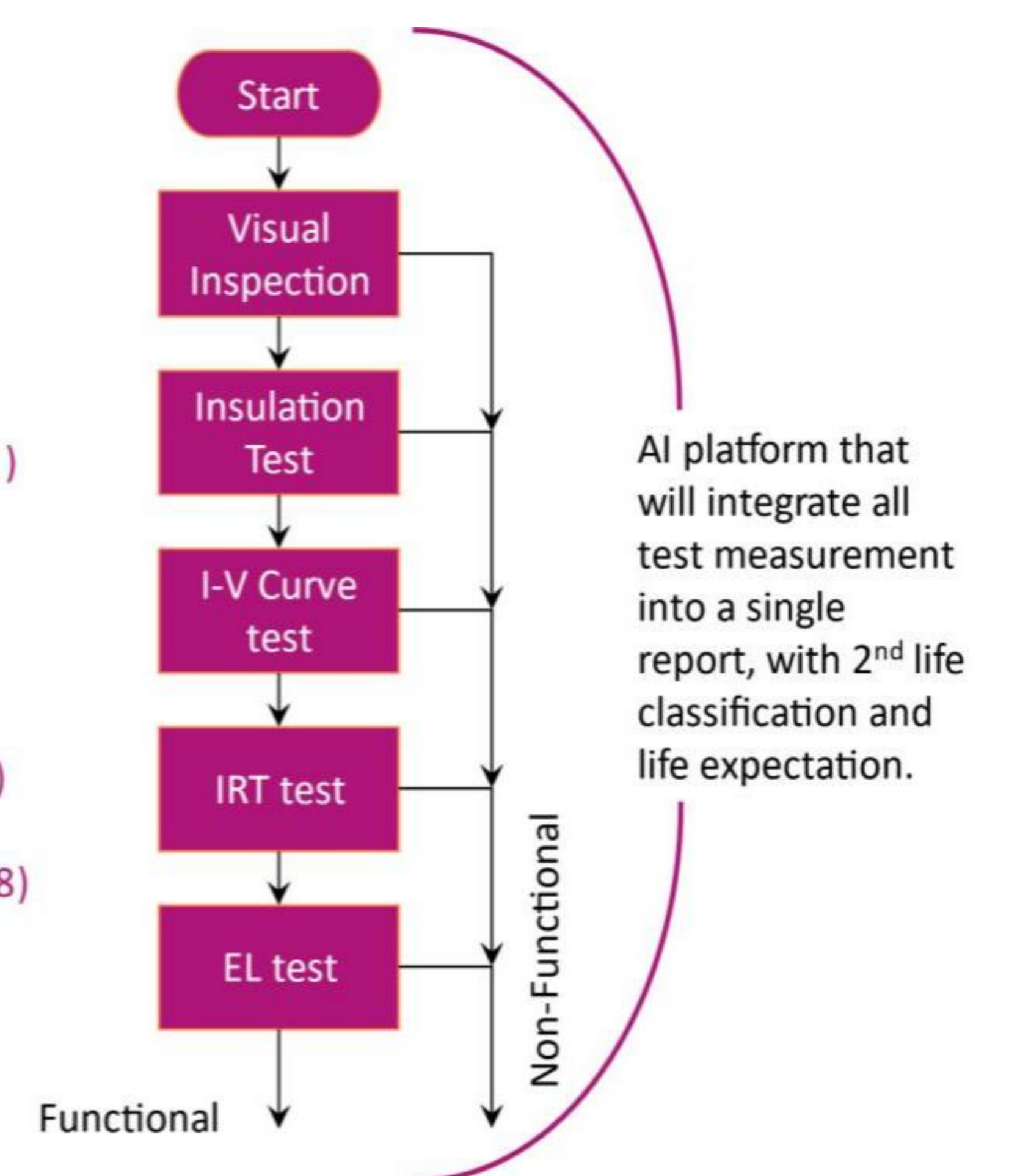
## 2. METHODOLOGY



## 3. TESTING PROTOCOLS FOR 2nd LIFE PV MODULES

Report IEA-PVPS T13-24:2021

1. Visual Inspection (IEC 61215-1; IEC 61215-2; IEA PVPS)
2. Electrical Insulation test (IEC 61215-1; IEC 61215-2)
3. I-V Curve measurement (IEC 60904-1)
4. Thermography imaging (IRT) (IEC 62446-3; IEA-PVPS T13-10:2018)
5. Electroluminescence imaging (EL) (IEC 60904-13; IEA-PVPS T13-10:2018)



## 4. APPLICATIONS OF 2ND LIFE PVM



Carport  
Parque Safari Rancagua (Chile)  
Source:  
<https://risingsunchile.cl/proyectos/>



Acoustic Barrier  
Carretera N470 Pijnacker (Netherlands)  
Source:  
<https://www.solarinnova.net/es/servicios/instalacion-s/fotovoltaica/pvnb#descripc%C3%B3n>



Facade  
Instituto Nacional de Ortodoncia (Chile)  
Source:  
<https://nuevacordova.cl/sustentabilidad.htm>



Irrigation  
Fundo Grossi e hijos (Chile)  
Source: [https://tritec-intervento.cl/case\\_study/proyecto-solar-fundo-grossi-e-hijos/](https://tritec-intervento.cl/case_study/proyecto-solar-fundo-grossi-e-hijos/)



Solar Greenhouse  
Serre Photovoltaïque Chaipale (Francia)  
Source:  
<https://urbasolar.com/referencias/produccion-agricola/>



Refurbished Housing  
Programme DS27 Housing Ministry (Chile)  
Source: <https://lanco.cl/minvu-anuncia-inicio-de-postulacion-para-mas-de-11-mil-proyectos-de-eficiencia-energetica/>

## 5. POTENTIAL PUBLIC PROGRAMS



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