



PV CYCLE

State of play: PV Panels Recycling Europe and
WEEE Compliance UK

7 June 2023



PV CYCLE - MILESTONES



2014 - EPR (WEEE incl PV Panels)

**2007-
2013**
FIRST
VOLUNTARY
TAKE-BACK PV
PANELS

NOT-FOR-PROFIT
ASSOCIATION



2010
65.000 tons - 1
GW - 11 Years

**2013-
2016**
OPENING
OFFICES
across
EUROPE
(DE,IT,FR,BE,
NL,UK,ES)



2015
ISO 9001 &
ISO 14001
Group

2017
GLOBAL
OPERATIONS



2022
15
EMPLOYEES
EU-WIDE

SERVICES OF PV CYCLE

GENERAL OVERVIEW



SERVICES

Waste management (downstream)

- **Take-back through:**
 - Fixed collection points
 - Direct pick-up service
 - Collection via municipal collection points (country-specific, B2C only)
 - Collection via (B2B) distributor locations (country-specific)
- State-of-the-art **refurbishment (re-use) recycling, recovery and final treatment**



Legal WEEE-Compliance (upstream)

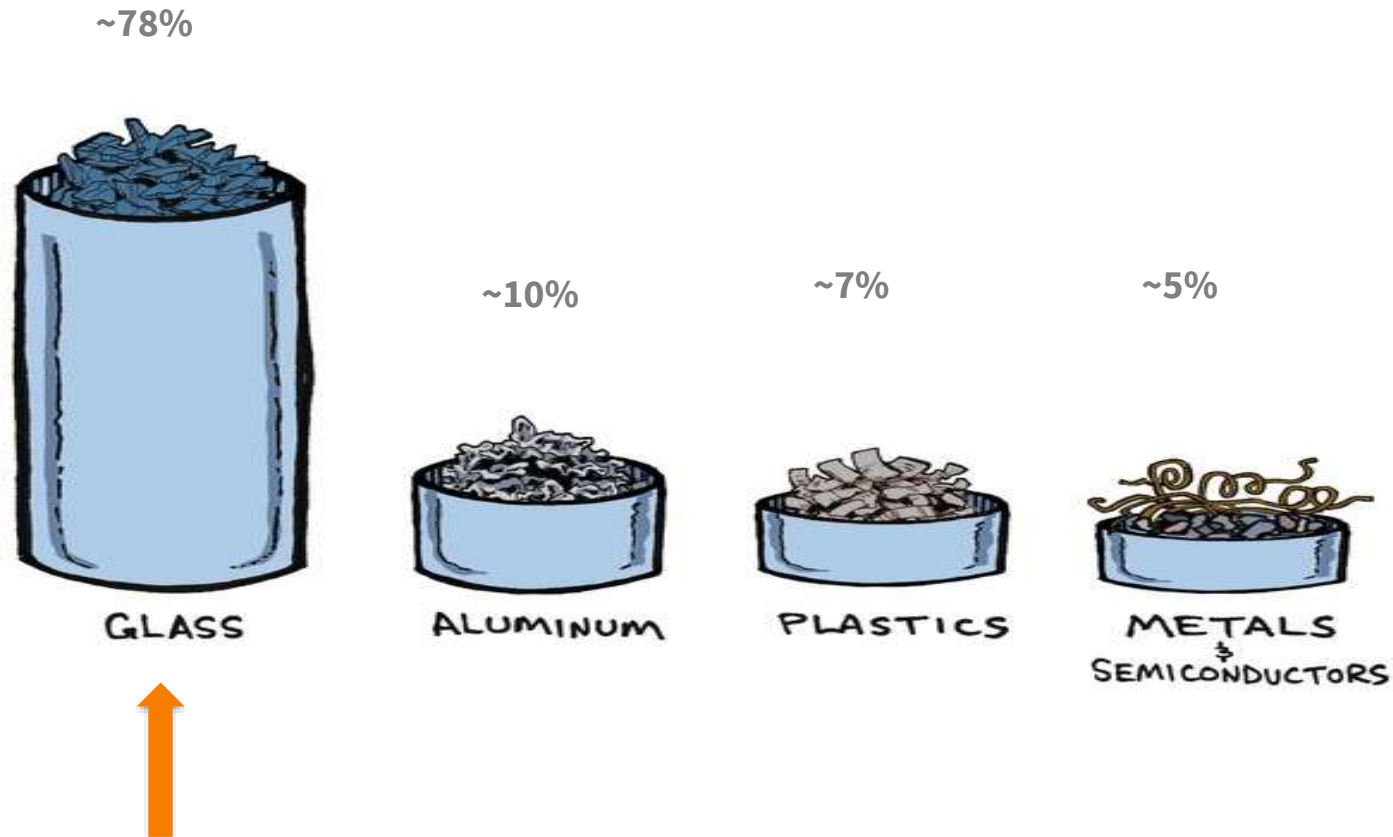
- Centralized **registration and declaration**
- **Financial guarantee** (country-specific)
- **Reporting Put-on-the-Market data to authorities (WEEE Register)**
- **Organisation of waste management**
- **Inform end-users** how to handle this waste
- **Inform treatment facilities** about the hazardous substances
- **Ensure financing of historical, current and future waste management**



COMPOSITION PV PANEL



On average, a PV Panel(*) consists of



(*) silicon based PV Panel

WASTE HIERARCHY



PV PANELS – BENCHMARKING THE WASTE HIERARCHY IN EUROPE



PREVENTION – REDUCE



- ❑ 10 Years Product guarantee
- ❑ 20+ Years Performance guarantee
- ❑ Average 10 Years Economical lifetime of PV System
- ❑ Many years FIT or other financial incentives

- ❑ Contributing to using more eco-friendly substances whilst delivering still a PV Panel with a 20+ Years guarantee – **A Challenge or Curse ?**
- ❑ Huge potential in Contributing to extended lifetime → Condition: qualitative, safe and environmentally sound reuse activities **with** and **without** a guarantee
 - **Why does the PV Industry not communicate about this ?**
 - **Are you not proud ?**

WHAT ABOUT REUSE ?



RECOMMENDATIONS PV CYCLE STUDY 2020

1. PREPARATION OF PV PANELS FOR RE-USE

- A. **Impose minimal testing requirements on visual inspection, electrical performance and safety tests** (with clear protocols to follow)
- B. **Set clear quantitative criteria related to the quality selection**
for example: only PV Panels > 70% initial performance and without safety concerns can be retained
- C. **Provide product warranty of 1-2 years**
- D. **Include labelling, documentation, track record requirements → Identity Card for each second-hand PV Panel**

2. DEVELOPMENT OF PV PANEL (AND ? ELECTRONIC WASTE) TREATMENT LINES OR FACILITIES LOCALLY IN LOW-INCOME COUNTRIES TO AVOID LANDFILLING AT END OF LIFE (BOTH FOR NEW AND SECOND - HAND PV PANELS)

3. DEVELOPMENT SPECIFIC GUIDELINES (IN THE EU WASTE FRAMEWORK DIRECTIVE) FOR A REUSE CENTER PREPARING *DEVICES GENERATING ELECTRICITY* FOR REUSE / SECOND - HAND SALES → **A NECESSITY**

WHAT ABOUT REUSE ?



PV CYCLE initiated the drafting of Technical Report 'REUSE PV' at IEC – WG 82

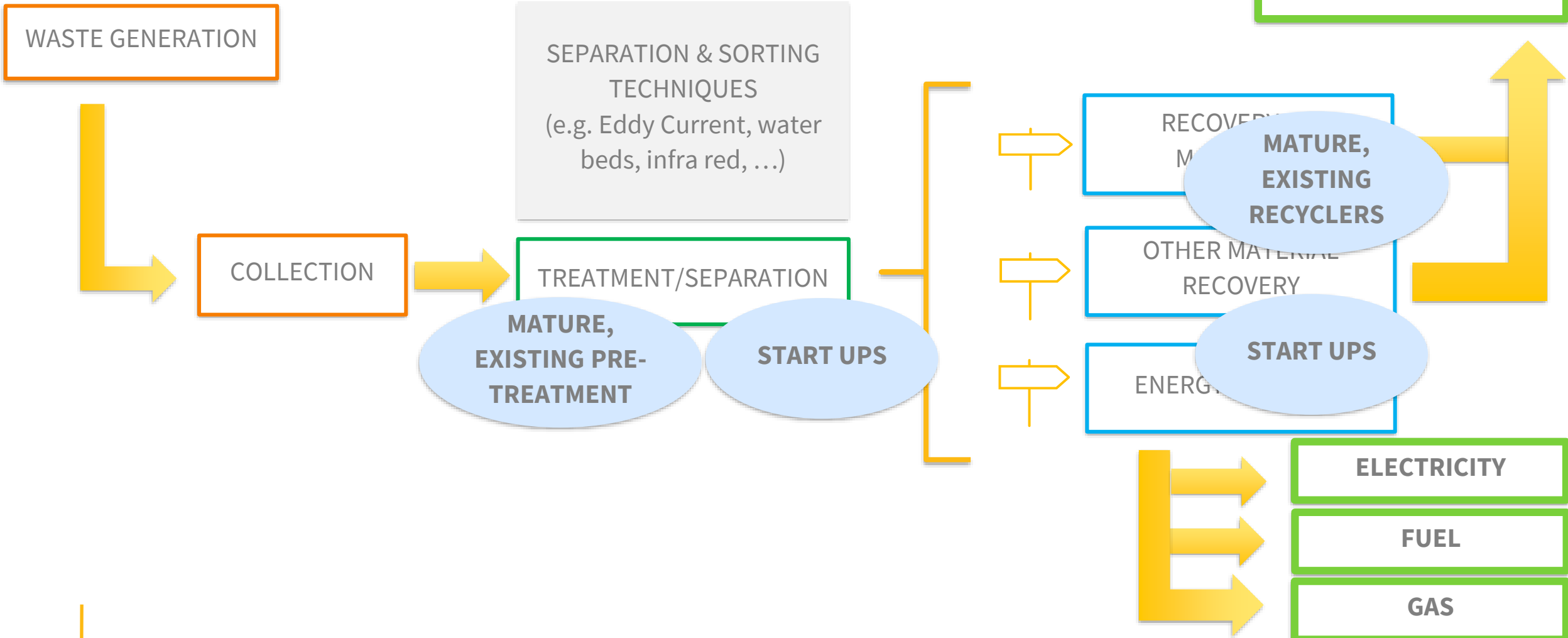
- Currently >30 worldwide Technical Experts
- Coordinator funded by PV CYCLE
- **Deliverable** expected by **October 2023**
- **Next step ?** Drafting of a **Standard/Norm** or **Technical Specification ?**

TREATMENT OF PV PANELS

THE PROCESS




FROM WASTE THROUGH RECOVERED MATERIALS and ENDING WITH RECYCLED MATERIALS



TREATMENT OF PV PANELS



- For **all types** of PV Panels there are suitable treatment solutions.
 - Only PV Panels containing all original components are suitable for recycling
 - Irrespective broken or not broken glass PV Panels can be treated
- In **laboratory and small-scaled treatment**, the **average and technical recycling rate** is **95%** (weight)
- PV CYCLE only applies so-called **BATNEEC(*)**
- **Today' small industrial scaled waste treatment activities**, result in an **average recycling rate of 70%** (weight).
 - Average for all PV technologies
 - Average for all PV CYCLE treatment partners
 - **Challenge:**  **Volume !!**
 - **However, Recycling yield PV Panels TODAY compared to other products under EPR:**



EUROPE RESULTS		
EPR PRODUCTS	RECYCLING YIELD % (year)	RECOVERY YIELD %
CARS	88 (2018)	
E-WASTE	38,4 (2018)	
PORTABLE BATTERIES	46 (2018)	
TYRES		75 (cement kilns etc)
PACKAGING	67,5 (2017)	81,7 (2017)
LUBRICANTS		75 (regeneration)

Sources: Eurostat, Eurobat(batteries)

(*) Best Available Techniques Not Exceeding Excessive Costs

EVALUATION WEEE DIRECTIVE 2012/19/EU



ANY OTHER ELECTRICAL & ELECTRONIC EQUIPMENT	PHOTOVOLTAIC PANELS
CONSUME ELECTRICITY	GENERATE ELECTRICITY
(relatively) SHORT LIFETIME	LONG LIFETIME
CONSUMABLE PRODUCT	INVESTMENT PRODUCT
SHORT REPLACEMENT CYCLES	LONG REPLACEMENT CYCLES
ROLLING (PAYG) FINANCING – SHORT LIFECYCLE	EQUAL FINANCING REQUIRED (PAYP) – LONG LIFECYCLE – FUTURE UNCERTAIN

EVALUATION WEEE DIRECTIVE

2012/19/EU



ANY OTHER ELECTRICAL & ELECTRONIC EQUIPMENT	PHOTOVOLTAIC PANELS
STABLE MARKET	VOLATILE MARKET
NO IMPACT FROM ENERGY POLICY	(HUGE) IMPACT BY ENERGY POLICY
NO IMPACT FROM GEOPOLITICAL DECISIONS	IMPACT FROM GEOPOLITICAL DECISIONS
NO SUBSIDY MECHANISMS	IMPACT BY SUBSIDY MECHANISMS
PRESENCE IN EACH EU MEMBER STATE – NORTH SOUTH EAST WEST	NOT IN EACH EU MEMBER STATE IS PV SOLAR ENERGY PRESENT

EVALUATION WEEE DIRECTIVE 2012/19/EU - IN A NUTSHELL



1. DEFINITION “PRODUCER”
2. GENERATE ELECTRICITY
3. VERY LONG LIFETIME
4. IMPACT BY ENERGY POLICIES
5. EPR (ACHIEVING TARGETS – CONSUMABLES) VERSUS PHOTOVOLTAIC AVOID WASTE / TARGETS UNDER SIEGE
6. COLLECTION TARGET – SALES OF PREVIOUS 3 YEARS
7. TREATMENT TARGETS FOR PLASTICS & METALS PRODUCTS VERSUS LAMINATED FLAT GLASS PRODUCTS
8. DEFINITION OF RECYCLING AND RECOVERY – 27 TIMES DIFFERENT
9. ‘DUAL USE’ NOTION
10. FINANCING
11. AUTHORIZED REPRESENTATIVE

RECOMMENDATIONS PV CYCLE



- 1. RENEWABLE ENERGY PRODUCTS AND EQUIPMENT DO NOT FIT UNDER THE WEEE DIRECTIVE**
2. EXCLUDE PHOTOVOLTAIC PANELS FROM THE SCOPE OF WEEE AND
- 3. CONDUCT AN IMPACT ASSESSMENT OF AN EXTENDED PRODUCER RESPONSIBILITY (EPR) LEGISLATION FOR ALL RENEWABLE ENERGY PRODUCTS AND EQUIPMENT WHICH ARE INVESTMENT PRODUCTS GENERATING ELECTRICITY AND HAVING A COMPLETELY DIFFERENT BUSINESS ENVIRONMENT THAN FAST-CONSUMING EEE CONSUMING ELECTRICITY AND**
4. CREATE A **LEVEL PLAYING FIELD FOR ALL RENEWABLE ENERGY EQUIPMENT (REE) IN THE POST-USAGE PHASE**
5. PRODUCER DEFINITION – **SINGLE PURPOSE VEHICLES ('HUGE AMOUNT OF ONE SHOT POM')**

RECOMMENDATIONS PV CYCLE



6. **DEFINE CLEARLY** WHICH ‘PHOTOVOLTAIC PANEL’ IS UNDER THE SCOPE
7. **DEFINE CLEARLY THE FINANCIAL OBLIGATIONS** FOR PRODUCTS WITH A VERY LONG LIFETIME
8. **FORBID COLLECTION OF REE THROUGH PUBLIC COLLECTION NETWORK**
9. **DEFINE KEY PERFORMANCE INDICATORS** RELATED TO COLLECTION AND RECOVERY INSTEAD OF “TARGETS”
10. **DEFINE MINIMUM WASTE TREATMENT REQUIREMENTS FOR REE**
11. **DEFINE CLEARLY THE MANAGEMENT OF HISTORICAL AND ORPHAN WASTE** FOR INDUSTRIES BEING FOR THE FIRST TIME UNDER THE SCOPE OF EPR

WEEE REGS COMPLIANCE UNITED KINGDOM



- **SAME EVALUATION AS FOR WEEE DIRECTIVE**
- **COLLECTION TARGET FOR PV PANELS IGNORES THE 'WASTE GENERATED' APPROACH**
- **ALMOST NO ENVIRONMENTALLY SOUND TREATMENT**
- **HUGE IMPACT OF BREXIT**

THANK YOU



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