

EPEAT: LIST OF CRITERIA

Computers and Displays (v 2018)

- 1. Substance Management
- 2. Materials selection
- 3. Design for end of life
- 4. Product Longevity/lifecycle extension
- 5. Energy conservation
- 6. End-of-life management
- 7. Packaging
- 8. Life cycle assessment and carbon footprint
- 9. Corporate environmental performance
- 10. Corporate social responsibility

Televisions

- 1. Reduction of use of hazardous substances
- 2. Materials selection
- 3. Design for end of life
- 4. Product longevity/life cycle extension
- 5. Energy conservation
- 6. End of life management
- 7. Corporate performance
- 8. Packaging

Imaging Equipment

- 1. Reduction/elimination of environmentally sensitive material
- 2. Materials selection
- 3. Design for end of life
- 4. Product longevity/life cycle extension
- 5. Energy conservation
- 6. End of life management
- 7. Corporate performance
- 8. Packaging
- 9. Consumables
- 10. Indoor air quality

Servers

- 1. Energy efficiency
- 2. Management of substances
- 3. Preferable materials use
- 4. Product Packaging
- 5. Design for repair, reuse and recycling
- 6. Product longevity
- 7. Responsible end-of-life management
- 8. Corporate responsibility



Mobile Phone

- 1. Supply Chain Management of Materials
- 2. Sustainable Materials Use
- 3. Substances of Concern
- 4. Energy Use Requirements
- 5. End of Life Management
- 6. Packaging
- 7. Corporate Sustainability
- 8. Life Cycle Asssessment
- 9. Supply Chain Impacts

Product Ratings: EPEAT Bronze, Silver and Gold

The EPEAT system was developed to recognize three levels of environmental performance: EPEAT Bronze, Silver and Gold. This multi-tier rating recognizes the leading products and also provides Manufacturers with increased recognition and incentive for achieving higher levels of performance.

The product rating (B/S/G) is determined as follows:

- EPEAT Bronze rated products meet all the Required criteria
- EPEAT Silver rated products meet all the Required criteria and 50% of the Optional criteria
- EPEAT Gold rated products meet all the Required criteria plus 75% of the Optional criteria



PCs & DISPLAYS CRITERIA

1 Substance Management

Required Criteria

- 1.1 (Required) Conformance with European Union RoHS Directive substance restrictions
- 1.2 (Required) Elimination of intentionally added mercury in light sources
- 1.3 (Required) Reduction of bromine and chlorine content in plastic parts > 25g
- 1.4 (Required) Compliance with provisions of EU Battery Directive

Optional Criteria

- 1.5 (Optional) Restriction on the use of cadmium
- 1.6 (Optional) Restriction of the use of beryllium
- 1.7 (Optional) Further reduction of bromine and chlorine content of plastic materials
- 1.8 (Optional) Avoidance or elimination of substances on EU REACH Annex XIV (authorization list)
- 1.9 (Optional) Reduction of substances on the EU REACH Candidate List of SVHCs
- 1.10 (Optional) Chemical assessment and selection
- 1.11 (Optional) IEC 62474 declarable substances
- 1.12 (Optional) Requesting substance inventory
- 1.13 (Optional) Acquiring substance inventory
- 1.14 (Optional) Reduce fluorinated gas emissions from flat panel display manufacturing
- 1.15 (Optional) Reduce fluorinated greenhouse gas emissions from semiconductor production

2 Materials selection

Required Criteria

2.1 (Required) – Minimum post-consumer recycled plastic, ITE-derived post-consumer recycled plastic or bio-based plastic content

Optional Criteria

2.2 (Optional) – Higher post-consumer recycled plastic, ITE-derived post-consumer recycled plastic, or bio-based plastic content



2.3 (Optional) – ITE derived post-consumer recycled plastic content

3 Design for end of life

Required Criteria

- 3.1 (Required) Identification of materials and components requiring selective treatment
- 3.2 (Required) Plastic parts compatible with recycling
- 3.3 (Required) Plastic parts separable for recycling

4 Product Longevity/lifecycle extension

Required Criteria

- 4.1 (Required) Service support
- 4.2 (Required) Removal of external enclosure
- 4.3 (Required) Spare parts
- 4.4 (Required) Battery replacement and information

Optional Criteria

- 4.5 (Optional) Long life rechargeable battery
- 4.6 (Optional) Publicly available service information
- 4.7 (Optional) Product upgradeability and reparability
- 4.8 (Optional) Removal of lithium ion batteries

5 Energy conservation

Required Criteria

- 5.1 (Required) Conformance to current ENERGY STAR® program requirements
- 5.2 (Required) Lowest power mode limit

Optional Criteria

5.3 (Optional) - Energy efficiency for internal power supplies

5.4 (Optional) – Energy efficiency for external power supplies exceeding International External Power Supply Efficiency Level VI



5.5 (Optional) – Product energy consumption less than the ENERGY STAR® Maximum energy limit

6 End-of-life management

Required Criteria

- 6.1 (Required) Provision of product take-back services
- 6.2 (Required) Provision of a removable rechargeable battery take-back program
- 6.3 (Required) End-of-life processing

7 Packaging

Required Criteria

- 7.1 (Required) Elimination of intentionally added heavy metals in packaging
- 7.2 (Required) Elimination of elemental chlorine as a bleaching agent in packaging material
- 7.3 (Required) Separable packaging material
- 7.4 (Required) Plastics marked in packaging materials
- 7.5 (Required) Recycled content in wood-based fiber packaging

Optional Criteria

7.6 (Optional) – Packaging composed of recycled, and/or bio-based, and/or sustainably forested content

7.7 (Optional) – Offering of a bulk packaging option

8 Life cycle assessment and carbon footprint

- 8.1 (Optional) Product life cycle assessment and public disclosure of analysis
- 8.2 (Optional) Product specific greenhouse gas emissions product carbon footprint
- 8.3 (Optional) Corporate carbon footprint
- 8.4 (Optional) Greenhouse gas emissions from product transport



9 Corporate environmental performance

Required Criteria

9.1 (Required) – Third party certified environmental management system (EMS) for design and manufacturing organizations

9.2 (Required) - Corporate environmental performance reporting by manufacturer

Optional Criteria

9.3 (Optional) – Third party certified environmental management system (EMS) for supplier manufacturing facilities

- 9.4 (Optional) Corporate environmental performance reporting by suppliers
- 9.5 (Optional) Energy management system/energy performance improvement manufacturers
- 9.6 (Optional) Energy management system/energy performance improvement for suppliers
- 9.7 (Optional) Renewable energy use by manufacturer
- 9.8 (Optional) Renewable energy use by manufacturer suppliers

10 Corporate social responsibility

Required Criteria

10.1 (Required) - Public disclosure regarding conflict minerals in products

Optional Criteria

- 10.2 (Optional) Socially responsible supplier manufacturing: Labor
- 10.3 (Optional) Socially responsible manufacturing: OHS

10.4 (Optional) – Participation in an in-region program that advances responsible sourcing of conflict minerals

10.5 (Optional) – Smelter and refiner participation in OECD-aligned third party mechanisms



IMAGING EQUIPMENT CRITERIA

1 Reduction/elimination of environmentally sensitive material

Required Criteria

- 1.1 (Required) Compliance with provisions of European RoHS Directive
- 1.2 (Required) Reporting on amount of mercury in light sources
- 1.3 (Required) Compliance with provisions of EU Battery Directive
- 1.4 (Required) Reducing BFR/CFR/PVC content of external plastic casings

Optional Criteria

- 1.5 (Optional) Further reduction of the use of EU RoHS Directive hazardous substances
- (cadmium) O 1.6 Use of non-mercury containing light sources
- 1.7 (Optional) Reduction of substances on the EU REACH Candidate List of SVHCs
- 1.8 (Optional) Eliminating or reducing BFR/CFR content of printed circuit board laminates
- 1.9 (Optional) Eliminating or reducing BFR/CFR/PVC content of product
- 1.10 (Optional) Reduce fluorinated gas emissions resulting from flat panel display manufacturing

1.11 (Optional) – Inventory of intentionally added chemicals residing in the product

2 Materials selection

Required Criteria

- 2.1 (Required) Declaration of postconsumer recycled plastic content
- 2.2 (Required) Minimum content of postconsumer recycled plastic
- 2.3 (Required) Declaration of biobased plastic materials content
- 2.4 (Required) Declaration of product weight

- 2.5 (Optional) Minimum 5% to 10% content of postconsumer recycled plastic
- 2.6 (Optional) Minimum 25% content of postconsumer recycled plastic
- 2.7 (Optional) Minimum content of biobased plastic material



3 Design for end of life

Required Criteria

- 3.1 (Required) Ease of disassembly of product
- 3.2 (Required) Use of single recyclable plastic type per plastic part
- 3.3 (Required) Restriction on materials not compatible with reuse and recycling
- 3.4 (Required) Manual separation and marking of plastics

3.5 (Required) – Notification regarding the identification of both materials and components that have hazardous characteristics or special handling needs

- 3.6 (Required) Preparation of product end-of-life characterization report
- 3.7 (Required) Minimum reusable/recyclable rate based on requirements of EU WEEE

Directive Optional Criteria

- 3.8 (Optional) Ease of disassembly of consumer products
- 3.9 (Optional) Minimum 90% reusable/recyclable

4 Product longevity/life cycle extension

Required Criteria

- 4.1 (Required) Early failure process
- 4.2 (Required) Spare parts

Optional Criteria

4.3 (Optional) – Product upgradeability

5 Energy conservation

Required Criteria

- 5.1 (Required) ENERGY STAR®
- 5.2 (Required) Standby power level \leq 1W and disclosure



5.3 (Optional) – Product specific greenhouse gas emissions—life-cycle assessment

5.4 (Optional) – Product specific greenhouse gas emissions—third-party verification or making LCA assessment publicly available

- 5.5 (Optional) Auto standby capability
- 5.6 (Optional) Default to automatic duplex printing

6 End of life management

Required Criteria

- 6.1 (Required) Provision of product take-back service
- 6.2 (Required) End-of-life processing requirements

Optional Criteria

- 6.3 (Optional) Provision of take-back service for broader scope of products
- 6.4 (Optional) Certification of programs exempt from end-of-life processing requirements

7 Corporate performance

Required Criteria

7.1 (Required) – Self-declared environmental management system for design and manufacturing

organizations

7.2 (Required) – Public disclosure of key environmental aspects

Optional Criteria

7.3 (Optional) – Third-party certified environmental management system for design and manufacturing organizations

- 7.4 (Optional) Public disclosure of supply chain toxics
- 7.5 (Optional) Product life-cycle assessment and public disclosure of analyses

8 Packaging

Required Criteria

8.1 (Required) – Elimination of intentionally added heavy metals in packaging



- 8.2 (Required) Elimination of elemental chlorine as a bleaching agent in packaging material
- 8.3 (Required) Separable packaging materials
- 8.4 (Required) Plastics marked in packaging materials
- 8.5 (Required) Recovered content in select fiber-based packaging materials

Optional Criteria

- 8.6 (Optional) Packaging 90% compostable/recyclable
- 8.7 (Optional) Provision of take-back service for packaging

9 Consumables

Required Criteria

9.1 (Required) – Allow use of general office paper with renewable content, recycled content, and that is chlorine free

- 9.2 (Required) Allow use of non-manufacturer cartridges and non-manufacturer containers
- 9.3 (Required) Provision of take-back and end-of-life management for cartridges and containers
- 9.4 (Required) Documentation that the cartridge or container is not designed to prevent its reuse

and recycling

Optional Criteria

9.5 (Optional) – Manufacturer recycles or reuses toner material collected through its cartridge and container take-back program

9.6 (Optional) – Manufacturer recycles or reuses plastics collected through its cartridge and container take-back program

10 Indoor air quality

Required Criteria

10.1 (Required) – Indoor air quality emissions requirements

TV - CRITERIA



1 Reduction of use of hazardous substances

Required Criteria

- 1.1 (Required) Compliance with provisions of European Union (EU) RoHS Directive
- 1.2 (Required) Reporting on amount of mercury in light sources
- 1.3 (Required) Compliance with provisions of EU Battery Directive

Optional Criteria

1.4 (Optional) – Further reduction of the use of EU RoHS Directive hazardous substances

(cadmium)

- 1.5 Use of non-mercury containing light sources
- 1.6 (Optional) Further reduction of the use of EU RoHS Directive hazardous substances

(lead)

- 1.7 (Optional) Reduction of substances on the EU REACH Candidate List of SVHCs
- 1.8 (Optional) Reducing BFR/CFR/PVC content of external plastic casings
- 1.9 (Optional) Eliminating or reducing BFR/CFR content of printed circuit board laminates
- 1.10 (Optional) Eliminating or reducing BFR/CFR/PVC content of product
- 1.11 (Optional) Reduce fluorinated gas emissions resulting from flat panel display

manufacturing

1.12 (Optional) – Inventory of intentionally added chemicals residing in the product

2 Materials selection

Required Criteria

- 2.1 (Required) Declaration of postconsumer recycled plastic content
- 2.2 (Required) Declaration of biobased plastic materials content
- 2.3 (Required) Declaration of product weight
- 2.4 (Required) Declaration of postconsumer recycled plastic content
- 2.5 (Required) Declaration of biobased plastic materials content
- 2.6 (Required) Declaration of product weight



Optional Criteria

- 2.7 (Optional) Minimum 5% to 10% content of postconsumer recycled plastic
- 2.8 (Optional) Minimum 25% content of postconsumer recycled plastic
- 2.9 (Optional) Minimum content of biobased plastic material

3 Design for end of life

Required Criteria

- 3.1 (Required) Ease of disassembly of product
- 3.2 (Required) Plastic markings
- 3.3 (Required) Restriction on materials not compatible with reuse and recycling

3.4 (Required) – Notification regarding and the identification of materials and components with special handling needs

3.5 (Required) – Minimum reusable/recyclable rate based on EU WEEE Directive

Optional Criteria

- 3.6 (Optional) One recyclable plastic type per rigid plastic part > 25g
- 3.7 (Optional) Manual separation of plastics for recycling
- 3.8 (Optional) Molded/glued-in metal eliminated or removable

3.9 (Optional) – Marking provided on the product identifying items containing materials with special handling needs

- 3.10 (Optional) Minimum 90% reusable/recyclable
- 3.11 (Optional) Preparation of end-of-life characterization report

4 Product longevity/life cycle extension

Required Criteria

- 4.1 (Required) Upgradeable firmware
- 4.2 (Required) Service information readily available
- 4.3 (Required) Early failure process

5 Energy conservation



Required Criteria

- 5.1 (Required) Compliance with current ENERGY STAR[®] specification
- *Hospital Grade TVs are exempt from compliance with the current ENERGY STAR® specification
- and instead must meet the previous ENERGY STAR® specification (Version 7.0) through
- September 1st, 2019. See GEC's announcement regarding Hospital Grade TVs.

Optional Criteria

- 5.2 (Optional) On Mode power performance exceeding ENERGY STAR®
- 5.3 (Optional) Additional On Mode power performance exceeding ENERGY STAR®
- 5.4 (Optional) Low standby power
- 5.5 (Optional) Automatic switch to sleep mode

6 End of life management

Required Criteria

- 6.1 (Required) Provision of product take-back service
- 6.2 (Required) End-of-life processing requirements

Optional Criteria

- 6.3 (Optional) Provision of take-back service for broader scope of products
- 6.4 (Optional) Certification of programs exempt from end-of-life processing requirements

7 Corporate performance

Required Criteria

- 7.1 (Required) Self-declared environmental management system for design and
- manufacturing organizations
- 7.2 (Required) Public disclosure of key environmental aspects

Optional Criteria

7.3 (Optional) – Third-party certified environmental management system for design and manufacturing organizations

- 7.4 (Optional) Public disclosure of supply chain toxics
- 7.5 (Optional) Product life-cycle assessment and public disclosure of analyses



Required Criteria

- 8.1 (Required) Elimination of intentionally added heavy metals in packaging
- 8.2 (Required) Elimination of elemental chlorine as a bleaching agent in
- packaging material
- 8.3 (Required) Separable packaging materials
- 8.4 (Required) Plastics marked in packaging materials
- 8.5 (Required) Recovered content in select fiber-based packaging materials

- 8.6 (Optional) Packaging 90% compostable/recyclable
- 8.7 (Optional) Provision of take-back service for packaging



SERVERS CRITERIA

1 Energy efficiency

Required Criteria

- 1.1 (Required) ENERGY STAR
- 1.2 (Required) Allowable temperature and humidity specifications

Optional Criteria

1.3 (Optional) – Liquid cooled server or air cooled servers operable at ASHRAE Class A3/A4 Temperature Ranges

- 1.4 (Optional) 80 plus program
- 1.5 (Optional) Active state power management enablement
- 1.6 (Optional) Server inactive power state #1
- 1.7 (Optional) Server inactive power state #2
- 1.8 (Optional) Energy efficient supply chains
- 1.9 (Optional) Reduce energy lost from power conversion
- 1.10 (Optional) Logged server activity metrics

2 Management of substances

Required Criteria

2.1 (Required) – Conformance with provisions of European Union RoHS Directive

2.2 (Required) – Conformance with substance restriction requirements of the European Union Battery Directive

2.3 (Required) - Reduction of Bromine and Chlorine content of plastic parts > 25 grams

2.4 (Required) – Conformance with supply chain communication provisions of European Union REACH Regulation

Optional Criteria

2.5 (Optional) – Further reduction of Bromine and Chlorine content of plastic parts > 25 grams

2.6 (Optional) – Reduction of substances on the European Union REACH Regulation Annex XIV (authorization list) and Candidate Substances of Very High Concern



- 2.7 (Optional) Record of declarable substances
- 2.8 (Optional) Disclosure of declarable substances
- 2.9 (Optional) Requesting full substance inventory
- 2.10 (Optional) Acquiring substance inventory
- 2.11 (Optional) Improving substance selection
- 2.12 (Optional) Making safer substance use hazard assessments publicly available

2.13 (Optional) – Mitigation and inventory of process fluorinated greenhouse gas emissions resulting from semiconductor manufacturing

3 Preferable materials use

Required Criteria

- 3.1 (Required) Declaration of postconsumer recycled plastic content
- 3.2 (Required) Minimum postconsumer recycled content in external enclosures

Optional Criteria

- 3.3 (Optional) Postconsumer recycled plastic content
- 3.4 (Optional) Postconsumer recycled content of rare earth elements in hard drive(s) in product
- 3.5 (Optional) Opt out program to reduce surplus parts

4 Product packaging

Required Criteria

4.1 (Required) – Elimination of added heavy metals in packaging

4.2 (Required) – Restriction on the use of elemental chlorine as a bleaching agent in paper-based packaging material

- 4.3 (Required) Enhancing recyclability of packaging materials
- 4.4 (Required) Recycled fiber content in corrugated packaging

- 4.5 (Optional) Restriction on the use of chlorine compounds in processing packaging materials
- 4.6 (Optional) Higher recycled fiber content in corrugated packaging



4.7 (Optional) – Elimination of individual packaging for hardware and components

4.8 (Optional) – Bulk packaging

5 Design for repair, reuse and recycling

Required Criteria

- 5.1 (Required) Design for repair, reuse and recycling
- 5.2 (Required) Design for plastics recycling
- 5.3 (Required) Product recyclability calculation and minimum 90% recyclability rate
- 5.4 (Required) Information and reporting in preparation for reuse and recycling

Optional Criteria

- 5.5 (Optional) Further design for plastics recycling
- 5.6 (Optional) Further information and reporting in preparation for reuse and recycling
- 5.7 (Optional) Product marked to identify components and materials requiring selective

treatment

- 5.8 (Optional) Information and reporting on disk drive magnet type and location
- 5.9 (Optional) Functionality testing software tools

6 Product longevity

Require Criteria

6.1 (Required) – Replacement components availability

7 Responsible end-of-life management

Required Criteria

- 7.1 (Required) Provision of product take-back service (corporate)
- 7.2 (Required) End-of-life processing requirements (corporate)
- 7.3 (Required) Trans-boundary movements (corporate)

Optional Criteria

7.4 (Optional) – Manufacturer take-back service for de-installed servers



7.5 (Optional) – Publicly available record of the reuse/recycling achievement

8 Corporate responsibility

Required Criteria

8.1 (Required) – Environmental management system (EMS) (corporate)

8.2 (Required) – Manufacturer conformance with occupational health and safety performance (corporate)

8.3 Required - Public disclosure of use of conflict materials in products (corporate)

Optional Criteria

8.4 (Optional) - Environmental management system (EMS) certification

- 8.5 (Optional) Environmental and social responsibility reporting on nine suppliers
- 8.6 (Optional) Environmental and social responsibility reporting on suppliers
- 8.7 (Optional) Public reporting of toxics release data
- 8.8 (Optional) Sourcing from validated conflict free smelters
- 8.9 (Optional) Participation in in-region conflict-free sourcing program
- 8.10 (Optional) Supply chain conformance to occupational health and safety performance

standards

- 8.11 (Optional) Certification to social responsibility performance standard
- 8.12 (Optional) Conduct life cycle assessment
- 8.13 (Optional) Public disclosure of LCA results
- 8.14 (Optional) Environmental impact of product transportation



MOBILE PHONES

1 Supply Chain Management of Materials

Required Criteria

1.1 (Required) – Compliance with the European Union REACH Regulation

Optional Criteria

- 1.2 (Optional) Reduction of European Union REACH Candidate SVHC Substances
- 1.3 (Optional) Substitutions assessment
- 1.4 (Optional) Requesting substance inventory
- 1.5 (Optional) Receiving substance inventory

2 Sustainable Materials Use

Required Criteria

2.1 (Required) – Declaration of post-consumer recycled and biobased plastics content

Optional Criteria

2.2 (Optional) – Post-consumer recycled plastic and biobased plastic content in the

mobile phone

2.3 (Optional) – Post-consumer recycled plastic and biobased plastic content in

accessories

3 Substances of Concern

Required Criteria

- 3.1 (Required) Compliance with the European Union RoHS Directive
- 3.2 (Required) Restrictions of extractable nickel
- 3.3 (Required) Restriction of cadmium and mercury in the mobile phone battery cell
- 3.4 (Required) Restriction of substances in textile and leather

Optional Criteria

3.5 (Optional) – Restrictions of DEHP, DBP, and BBP product



3.6 (Optional) – Restriction of bromine and chlorine

4 Energy Use Requirements

Required Criteria

- 4.1 (Required) Battery charger systems
- 4.2 (Required) External power supply energy efficiency

Optional Criteria

- 4.3 (Optional) Reduction of energy consumption of battery charging systems
- 4.4 (Optional) Reduced maintenance mode power

5 End of Life Management

Required Criteria

- 5.1 (Required) Take-back program
- 5.2 (Required) Primary recyclers third party certified

5.3 (Required) – Battery removability/replacement by qualified repair service providers or authorized repair providers

- 5.4 (Required) Ease of disassembling mobile phone
- 5.5 (Required) Feature to erase user data from mobile phone
- 5.6 (Required) Repair and refurbishment
- 5.7 (Required) Availability of replacement parts

5.8 (Required) – Notification regarding and the identification of materials and components requiring selective treatment

- 5.9 (Optional) Battery removability/replacement instructions
- 5.10 (Optional) Battery removability/replacement without use of tools
- 5.11 (Optional) Further ease of disassembling mobile phone
- 5.12 (Optional) Further repair and refurbishment

Mobile Phones 6 Packaging

epeat

Required Criteria

- 6.1 (Required) Separability and labeling of plastics in packaging
- 6.2 (Required) Expanded polystyrene packaging (EPS) restriction
- 6.3 (Required) Recycled content in fiber packaging
- 6.4 (Required) Restriction of chlorine in packaging materials
- 6.5 (Required) Heavy metal restriction in packaging

Optional Criteria

- 6.6 (Optional) Use of recyclable fiber based packaging materials
- 6.7 (Optional) Use of post-consumer recycled plastic packaging
- 6.8 (Optional) Environmentally preferable paper/paperboard in POS

packaging

6.9 (Optional) - Environmentally preferable paper/paperboard for printed

content

6.10 (Optional) – Improve packaging efficiency

7 Corporate Sustainability

Required Criteria

7.1 (Required) - Corporate sustainability (CS) reporting

Optional Criteria

7.2 (Optional) - Corporate sustainability (CS) reporting in the supply chain

7.3 (Optional) – Third party assurance of corporate sustainability (CS)

reporting

8 Life Cycle Assessment

Optional Criteria

- 8.1 (Optional) Conducting a life cycle assessment
- 8.2 (Optional) Product LCA third-party verification of making LCA

publicly available



9. Supply Chain Impacts

Required Criteria

- 9.1 (Required) Final assembly facilities environmental management system
- 9.2 (Required) Conflict minerals public disclosure

Optional Criteria

- 9.3 (Optional) Supplier responsibility
- 9.4 (Optional) Supplier production facilities environmental management system
- 9.5 (Optional) Reduce fluorinated gas emissions resulting from flat panel display

manufacturing