

Electronics power modern life but also create serious sustainability challenges, from resource extraction and energy use to e-waste and recycling. This framework explores six areas—awareness, production, usage, disposal, innovation, and policy—through questions and discussion. By examining these themes, participants can better understand the environmental impact of electronics and consider practical solutions for a more sustainable future.

# Electronic Sustainability

Personal Project 2025

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## 100 Reflection Questions

Electronics are at the heart of modern life, but their impact on the environment raises urgent questions about sustainability. From the mining of rare earth metals and energy-intensive manufacturing to high electricity consumption during use and the growing problem of e-waste, every stage of an electronic device's lifecycle poses challenges. Addressing these issues means rethinking how electronics are designed, produced, used, and disposed of—through approaches like modular and repairable devices, improved recycling systems, energy-efficient technologies, and circular economy models. Governments, companies, and consumers all share responsibility in driving change, whether through policy, innovation, or conscious consumption. Ultimately, sustainable electronics are not just about reducing harm but also about creating long-lasting, ethical, and resource-efficient technologies that support both human needs and the planet's future.

 General Awareness (1–15)

1. What does “sustainable electronics” mean to you?
2. How do electronics impact the environment?
3. What is e-waste, and why is it a growing problem?
4. How much e-waste is produced globally each year?
5. Which countries generate the most e-waste?
6. Do you know where your old devices end up?
7. How long do most people keep their phones before upgrading?
8. Why do companies design products with short lifespans?
9. What are rare earth metals, and why are they important in electronics?
10. What environmental issues arise from mining rare earth elements?
11. How much energy is required to manufacture a smartphone?
12. How can consumers reduce their electronic footprint?
13. What role do governments play in regulating e-waste?
14. What is the link between electronics and climate change?
15. How much of electronics’ carbon footprint comes from production vs usage?

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Electronics bring convenience, but they also generate massive amounts of waste and carbon emissions that often go unnoticed. Many people don’t think about where their old phones or laptops end up.

👉 **Discussion angle:** Start with everyday experiences—“*How many unused devices do you have in a drawer at home?*”—to make people reflect personally and open the floor to broader environmental issues.

 Production & Materials (16–35)

16. Where do the raw materials for electronics come from?
17. What are the environmental costs of mining cobalt and lithium?
18. How much water is used in semiconductor production?
19. Are electronics companies transparent about their supply chains?
20. What are conflict minerals, and how do they relate to electronics?
21. How can we make the supply chain for electronics more ethical?
22. Can recycled metals fully replace mined ones in electronics?
23. What toxic chemicals are used in electronics manufacturing?
24. How does manufacturing contribute to greenhouse gas emissions?
25. What does “green electronics” mean in practice?
26. Which companies are leading in sustainable production?
27. Can modular design reduce the need for new production?
28. How can 3D printing make electronics more sustainable?
29. What role do renewable energy sources play in electronics factories?
30. Is it realistic to make electronics entirely from biodegradable materials?
31. How can packaging of electronics be made more sustainable?
32. Should governments tax unsustainable electronic production?
33. How does globalization affect sustainable electronics?
34. What is the environmental impact of silicon chip production?
35. Could local manufacturing reduce emissions from electronics?

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The production of electronics relies heavily on rare earth metals, water, and energy, often tied to unethical mining practices. These hidden costs make “cheap” devices far more expensive for the planet.

👉 **Discussion angle:** Ask—“Would you pay more for a device if you knew the materials were ethically sourced and environmentally friendly?”—to spark debate about consumer responsibility vs. corporate accountability.

 Usage & Energy (36–55)

36. How much energy do our personal devices consume daily?
37. Are newer electronics always more energy-efficient?
38. What role does software play in energy consumption?
39. How can users reduce the energy use of their devices?
40. How much electricity do global data centers use?
41. Do cloud services help or hurt sustainability?
42. Are smart devices actually energy-saving?
43. How does “vampire power” from plugged-in devices add up?
44. Should manufacturers be required to publish energy ratings?
45. How much CO<sub>2</sub> does streaming videos contribute globally?
46. How sustainable is cryptocurrency mining?
47. What’s the environmental impact of artificial intelligence workloads?
48. Can better coding reduce energy consumption?
49. Should governments regulate energy-hungry tech like AI and crypto?
50. How does 5G impact energy usage compared to 4G?
51. Are electric vehicles really sustainable when electronics are considered?
52. How can renewable energy power consumer electronics?
53. What are low-power chips, and how do they help sustainability?
54. Should energy-saving features be mandatory in devices?
55. How does device size (e.g., smartphones vs desktops) affect energy use?

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Even after production, electronics consume significant energy—through device charging, data centers, and digital services like streaming or crypto mining. Software efficiency and user habits also make a big difference.

👉 **Discussion angle:** Compare habits—“*Which do you think uses more energy: streaming movies or charging your phone all year?*”—to surprise people and encourage them to rethink everyday choices.

 Disposal & Recycling (56–75)

56. What happens when electronics end up in landfills?
57. How dangerous are the toxins in discarded electronics?
58. How can recycling rates for electronics be improved?
59. Why do so few people recycle their electronics properly?
60. How can urban mining recover valuable metals?
61. Are current recycling technologies efficient enough?
62. How can we separate complex materials in electronics for reuse?
63. Should companies be responsible for recycling their own products?
64. Should there be global standards for e-waste management?
65. What role can local governments play in e-waste collection?
66. Are take-back programs effective?
67. Why is it hard to recycle lithium-ion batteries?
68. What happens to electronics shipped to developing countries?
69. How can informal e-waste recycling harm human health?
70. What percentage of electronics are currently recycled worldwide?
71. Should recycling electronics be mandatory by law?
72. Can we design electronics that are easier to recycle?
73. Is refurbishing more sustainable than recycling?
74. How do second-hand markets reduce e-waste?
75. What role can consumers play in extending electronics' lifespan?

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E-waste is one of the fastest-growing global waste streams, yet most electronics are not recycled properly. Valuable metals are lost while toxins leak into the environment.

👉 **Discussion angle:** Open with—“*What stops people from recycling their old electronics—lack of awareness, convenience, or trust in recycling systems?*”—to uncover barriers and explore solutions together.

 Innovation & Solutions (76–90)

76. What is the circular economy in electronics?
77. How can modular phones reduce waste?
78. Can open-source hardware contribute to sustainability?
79. How can AI optimize electronic waste recycling?
80. What role does repairability play in sustainability?
81. Should companies be forced to provide spare parts for repairs?
82. What's the potential of biodegradable circuit boards?
83. How can we make batteries more sustainable?
84. What are the alternatives to lithium-ion batteries?
85. How can nanotechnology improve sustainability?
86. What role does design for disassembly play in sustainability?
87. Can blockchain help track electronics for recycling?
88. Should we create global databases of electronic parts?
89. How can product-as-a-service (leasing instead of owning) help sustainability?
90. What role do startups play in sustainable electronics?

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Solutions exist: modular phones, biodegradable materials, urban mining, right-to-repair laws, and circular economy models. The challenge is scaling these ideas and making them mainstream.

 **Discussion angle:** Ask—“*If you could design one change in how electronics are made or used to make them more sustainable, what would it be?*”—to encourage creative and forward-looking discussion.

 Future & Policy (91–100)

91. Will sustainability drive innovation in consumer electronics?
  92. Should governments ban non-recyclable electronics?
  93. How can education raise awareness about sustainable tech?
  94. What would a 100% sustainable electronics industry look like?
  95. How can international cooperation reduce e-waste dumping?
  96. Should there be a global right-to-repair law?
  97. How can taxes or incentives promote sustainable electronics?
  98. What responsibility do consumers have in driving demand for green tech?
  99. Will future electronics rely more on recycled than virgin materials?
  100. Can technology itself solve the problems caused by technology?
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The future of sustainable electronics depends not only on technology but also on strong policies, international cooperation, and consumer behavior. Ideas like global right-to-repair laws, taxes on unsustainable production, and incentives for recycling could reshape the industry. At the same time, consumers play a key role by demanding greener options and keeping devices longer.

 **Discussion angle:** Ask—“Who should lead the push for sustainable electronics: governments, companies, or consumers?”—to spark debate about responsibility and power in shaping future change.