



PROTECT THE PLANET

Study circle



ENERGY USE IN DAILY LIFE – TECHNOLOGY

This guide has been designed to help Centres/Groups of the Sathya Sai International Organisation (SSIO) facilitate a study circle on the topic of Technology and its impact on the environment. It has been developed as part of a series of study circle guides that aim to look at energy use in daily living. This is part 4 with an estimated duration of one hour.

Part 4 will cover: Evolution of technology, its advantages and disadvantages, energy consumption in relation to technological products, environmental issues, technology and spirituality, Ceiling on Desires – distinguishing between want and need for technological products, and reducing our energy footprint.

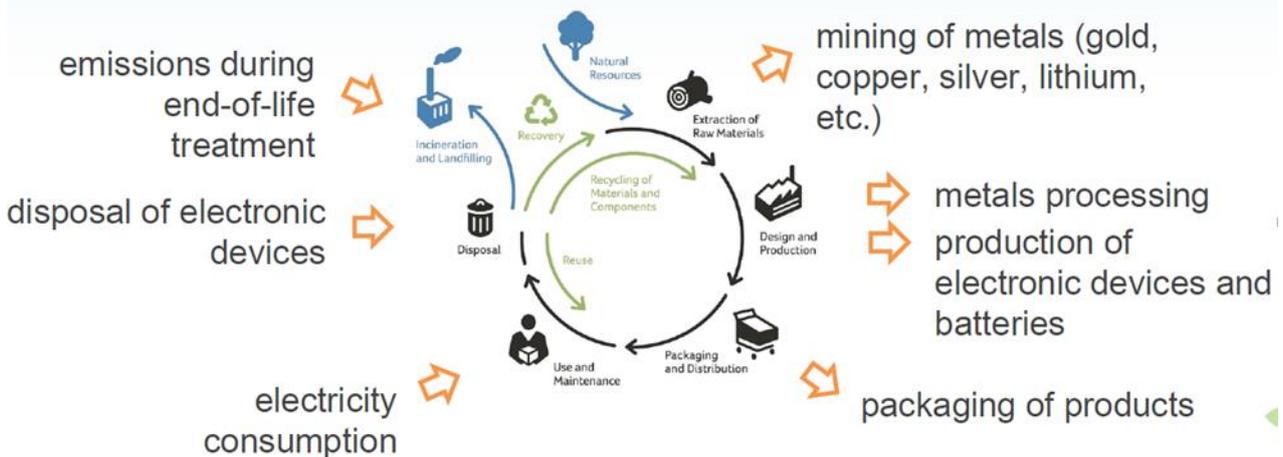
PART 4

OPENING AND INTRODUCTION			
ACTIVITY	NOTE TO FACILITATOR	RESOURCES	DURATION
3 OM's or silent sitting followed by an opening prayer	Depending on the audience of this study circle, either omkar or a minute of silent sitting can be done. Either way, the objective of this activity is to help settle the group and establish group dynamics. This is the same for whether a prayer or short reading is used.		1 min
Introduce today's topic	<p>This study circle is part of the Serve the Planet (STP) initiative of the SSIO and is based on the theme 'Protect The Planet' with a focus on 'Energy.'</p> <p>The purpose of this study circle is to better understand the impact of our use of technology on the planet and how it can be used responsibly to make the planet more sustainable.</p> <p>It is important to remain respectful and open at all times. Keep in mind that the study circle is about sharing and exploring the topic and inspiring each other rather than 'finding the right answers.'</p>		1 min
TODAY'S DELIVERY			
ACTIVITY	NOTE TO FACILITATOR	RESOURCES	DURATION
Discussion on: Technology – Meaning, Evolution and Pros & Cons	<p>What do we mean by Technology?</p> <p>Pose the question to the group. Once participants have shared their thoughts, the facilitator should round off the first question with the following thoughts.</p> <p>Meaning of the word 'technology' as per Encyclopaedia Britannica is 'the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, the change and manipulation of the human environment.'¹</p> <p>The use of the term 'technology' has changed significantly over the last 200 years. The term 'technology' rose to</p>	<p>Video 1: https://www.youtube.com/watch?v=NoX6mOg2EZQ (2 mins)</p> <p>Video on the evolution of technology</p>	8 mins

	<p>prominence in the 20th century in connection with the second Industrial Revolution. Technology can be most broadly defined as the entities, both material and immaterial, created by the application of mental and physical effort in order to achieve some value. In this usage, technology refers to tools and machines that may be used to solve real-world problems.²</p> <p>The new technologies, which are undergoing regular advancements are computers, communication technology, digital technology, multifunctional devices including mobile phones and military weapons.³</p> <p>Play Video 1 to understand the evolution of technology, and when finished encourage the group to think about both the advantages and disadvantages of technology. Some examples include:</p> <p><u>Advantages</u>³</p> <ul style="list-style-type: none"> ● Better communication ● Automation of jobs ● Easy access to information ● Innovation and creativity ● Increased efficiency and productivity <p><u>Disadvantages</u>³</p> <ul style="list-style-type: none"> ● Reduced human interactions and knowledge ● Loss of jobs ● Privacy issues ● Intellectual property theft and cyber attack ● Environmental issues <p>Technology is good because it simplifies the way we do things in our daily lives, however, if incorrectly applied, it can be harmful in many ways.</p>	<p>(*Note if no video facilities are available on-site, participants can be sent ALL video links beforehand to watch at home prior to the study circle taking place).</p>	
<p>Discussion on: Energy consumption in relation to Technology</p>	<p>Begin this exercise by requesting all participants to close their eyes and assess the following:</p> <ul style="list-style-type: none"> ● What common household technological products (appliances and gadgets) do you have? ● Do these products enable to get your work done quickly and efficiently? ● Do you have more than one of the same product, e.g. television, laptop/computer, etc.? <p>Spend two minutes for the above exercise, then ask the below questions for discussion.</p> <ul style="list-style-type: none"> ● Of all the technological products you possess, do you know which item consumes the most energy? ● Are you aware of the manufacturing and supply chain process of these appliances and gadgets, and the energy needed for each stage of the process? <p>After discussing the above questions, the information below</p>		<p>10 mins</p>

can be shared with the group.

The appliances, gadgets and other technologies we enjoy would have gone through various phases; starting from the extraction of raw materials, then to the development phase, to testing, to manufacturing the final product and service; with various forms of energy being consumed at each stage. Technological products continue to consume energy when we use/operate them and even after we dispose them of. The diagram below shows the life-cycle assessment (the supply chain) of a product, and how energy is used at each stage of the process as well as the energy required to transport materials and products from one stage to the other.



(source: <https://ictfootprint.eu/en/news/solutions-energy-management-life-cycle-assessment-lca-ict-field-0>)

The above diagram demonstrates that any appliances and gadgets we use ultimately contribute to our energy and carbon footprint. In addition to the energy and resources used to make a technological product or appliance, there is the energy required to operate the produce. **Attachment A** shows the energy consumption required to operate a few common, household gadgets.

Discussion on: **The environmental impact of Technology**

Pose the following question to the group:

What are the effects of technology on the environment?

Once participants have shared their thoughts, the facilitator should round off the question with the below thoughts, and any ideas not shared by the group should be elaborated upon.

The effect of technology on the environment is so huge that there is drastic climate change around the world. There is damage in the form of warming of the earth, leading to the rise in sea level, changes in weather patterns, extinction of birds and plants, and also greater propensity for diseases. These changes are due to an increase in pollution, heat generation, inactive life habits, excess reliance on gadgets,

10 mins

etc.⁵

Given below are the effects of technology on the environment:⁵

- **Increase in travel and pollution:** In the past, we relied on horses and camels for travel. With the advancement in technology, we now travel more frequently and greater distances in a shorter time. **As technology advances, pollution of air, water, land, radiation and noise also increases.** *Can you explain how pollution is increased in this context?*
- **Excess power consumption:** We use technology in education, in the workplace, at home and even in remote places. We are highly dependent on television, computer, smartphones and other gadgets. Before technological advancements, our use of electricity was basic and mainly used for lighting homes. Now, use electricity 24 hours a day and in all seasons, to keep our gadgets and appliances running. We need electricity to run our home appliances, such as refrigerator, microwave oven, dishwasher, washer and dryer, entertainment systems, etc. The constant need of electric energy to make our gadgets work non-stop, leads to **burning of fossil or nuclear fuels on a large scale.**
- **More waste generation (e-waste):** We contribute a large amount of toxic waste in the name of technological upgradation. In 2012, 50 million tonnes of e-waste was generated worldwide – or about 7 kg for every person on the planet. These are electronic goods made up of hundreds of different materials and containing toxic substances such as lead, mercury, cadmium, arsenic and flame retardants. An old-style CRT computer screen can contain up to 3 kg of lead, for example.⁶ Previously, we used large sized computers. For this we needed large monitors, CPUs, separate keyboards, mouse etc. Now we tend to use laptops and tablets. As advertisement stimulates our greed and desires, we tend to frequently upgrade our computer/laptop/tablet, music system, mobile phone, etc., and as a result, all of these are creating electronic (e-waste) at a rapid scale. While we upgrade our technological devices, we get rid of old items, which not only can cause serious life-threatening health issues if disposed of irresponsibly, they are being transported thousands of miles to West Africa and Asia for dumping.⁶ *What do you do with old electronic items after replacing them with new ones? Do you follow the 5Rs (Refuse, Reduce, Repurpose/Repair, Reuse, Recycle)?*
- **Deforestation:** Technological developments like any other kind of development requires space and hence land, leading to deforestation and a

	<p>displacement of animals and natural habitats which leads to extinction of species and loss of biodiversity affecting the environment's natural cycles.⁷</p> <p>Pose the following question to the group and read the quote below:</p> <p>Do you know the impact of wireless technologies, i.e. 2G, 3G, 4G and the much awaited 5G?</p> <p>The wireless technologies of 2G, 3G and 4G, currently in use within our cell phones, computers and wearable tech, create radiofrequency exposure, which poses a serious health risk to humans, animals and the environment. The 5G technology is intended to be the technology that allows the Internet of Things (IOT) to exist and tie all internet connected devices together. However, scientists are cautioning that before rolling out 5G, its effects on human and ecological health must be urgently investigated, to ensure the public and environment are protected.⁸</p> <p>An appeal by more than 180 scientists and doctors from 36 countries, recommend a moratorium on the roll-out of 5G until potential hazards for human health and the environment have been fully investigated. The appeal mentions that 5G technology is effective only over short distances. This means several new antennas will be required and the full-scale implementation will result in antennas every 10 to 12 houses in urban areas, thus massively increasing radiofrequency exposure. With the increased number of 5G-transmitters and the connection of all electronic appliances (refrigerators, washing machines, surveillance cameras, self-driving cars and buses, etc.), as parts of the IOTs, 5G will substantially increase exposure to radiofrequency electromagnetic fields (RF-EMF). It is argued that the increased exposure to this RF-EMF will lead to serious health problems, including, cancer risks, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and overall negative impacts on the general well-being of humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plants and animals.⁹</p> <p>“Today scientists are interested in new inventions. The advancement in science and technology has also led to imbalance in Nature. As a result, there are earthquakes and no timely rains. Science should be utilised only to the extent needed. Science has its limitations, and crossing those limits leads to danger.” – Sathya Sai Baba (SSS 34.3: February 21, 2001)</p>		
Discussion on:	Read out the quote given below and ask questions for		5 mins

<p>Technology & Spirituality</p>	<p>introspection.</p> <p>“The astonishing progress of science and technology has not brought with it corresponding powers of discrimination and wisdom. Man must realise that the sense organs, through which he explores the external and discovers the powers latent in Nature and the physical universe, function because of the Divinity which is immanent in them. Without the power of the Divine, the eyes cannot see, or the ears hear or the mind think.” – Sathya Sai Baba (SSS 17.11: May 12, 1984)</p> <ol style="list-style-type: none"> 1. How do scientists work? 2. What are the tools they use? 3. Do you find any relation between technology and spirituality? <p>Potential answers could be that a scientist uses keen observation and deep thinking to base his/her findings. Scientists depend solely on the senses and human brain for their findings.</p>  <p>Source: http://media.radiosai.org/journals/vol_14/01JUN16/Sai-Inspires-Part-15-Reflections-Prof-G-Venkataraman.htm</p> <p>Once the questions are answered, read out the following paragraph from Sai Inspires Reflections by Prof. G. Venkataraman.¹⁰</p> <p>No matter what, science as it is today, simply cannot go beyond the senses and the mind. And yet we do know intuitively, that there are dimensions beyond the science and the mind. The ancient seers dared to explore that transcendental realm, and were ecstatic to discover there a Supreme entity that we popularly refer to as God. Thus it is that Sathya Sai Baba often used to quote the ancient <i>rishis</i> (sages) who said, There is something beyond the realm of the senses, words and thoughts which is indescribable. We have been there and experienced the bliss of becoming one with that Supreme and indescribably effulgent entity, i.e., God.¹⁰</p>		
<p>Discussion on: Ceiling on Desires in</p>	<p>Read the quote mentioned below and brainstorm with the group about the following question:</p> <p>How can we practice ‘Ceiling on Desires’ (COD) in relation</p>		<p>15 mins</p>

<p>relation to technology</p>	<p>to technology?</p> <p>“In order to protect Nature, man has to practice a ceiling on desires. He should not trigger the negative aspect of Nature. In this respect, scientists have no concern for the harmful effects that may accrue to society by their inventions. They do not care for the welfare of mankind and go on making use of intelligence to produce their weapons of destruction. Care should be exercised in providing comforts as excessive comforts may spoil man’s mind and cause misery instead of happiness. Nothing good can be achieved without certain restraints. Because of the advancement of technology and provision of excessive comforts, life has become mechanical and spirituality has declined.” – Sathya Sai Baba (SSS 26.3: January 21, 1993)</p> <p>We can practice COD by being conscious of our daily habits, remembering that the manufacturing of new products and even disposal of items requires energy, not to mention the energy required to operate these items on a day-to-day basis. By following the 8Rs below to the best extent possible, we will be able to lessen our carbon footprint, conserve energy and live simply and happily.</p> <ul style="list-style-type: none"> ● Respect Mother Nature and use resources wisely ● Refuse what you do not <u>need</u> ● Reduce your consumption. Ask yourself 'Do you really need it?' Do not fall for things shown by advertisers ● Rethink what you buy – buy only what is needed and buy quality products that last longer. This reduces the need to replace products frequently, lessening our energy and carbon footprint ● Reuse/repurpose/repair what can be used or made functional. If you are replacing gadgets that are still functional, donate them to the needy, either directly or through charities that distribute them ● Recycle what cannot be reused and do it responsibly <p>For additional practical tips on ways to reduce our energy footprint, please refer to the mini-booklet available at http://www.sathyasai.org/ya/serve-the-planet.</p> <p>Before we move on to the following two exercises on COD, let us look at a small incident, which Sathya Sai Baba himself narrated.</p> <p>“A small incident happened some time ago. While conversing with Me in the interview room, Siva Sankar Sai, the warden of our senior boys hostel, said, ‘Swami, Your eyes have become red.’ I replied, ‘That is due to My own mistake. I do not waste water like you people. When you wash your face, you leave the tap open continuously. While you apply soap to your face, you waste a lot of water by leaving the tap open. But I do not do like that. I open the tap</p>		
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	<p>only when it is necessary and close it immediately. After applying soap to My face, I opened My eyes to open the tap. In the process, a small amount of soap entered My eyes and hence My eyes became red.' I do not waste even a drop of water because water is God. Air is also a form of God. That is why I switch off the fan immediately when it is not required. Some people keep the light on throughout the night even if it is not required. But I switch on the light when it is necessary and at once switch it off when it is not needed. This is not miserliness. I am not a miser. I am the embodiment of sacrifice. But I don't like to waste anything. Use everything as much as it is necessary. But people today are misusing the five elements." – Sathya Sai Baba (Divine Discourse, July 18, 1996, Sanathana Sarathi, April 2012)</p> <p>Now, let's do two exercises in practicing COD.</p> <p>EXERCISE 1:</p> <ul style="list-style-type: none"> ● Ask everyone in the group to turn off their mobile phones (give about 30 seconds for this). ● Now ask the participants to raise their hand if they were not happy switching off their phones or putting it on a silent mode. ● Briefly discuss the 'need for technology' versus the 'want for technology'. ● Resolve to practice COD by reducing our usage/reliance beyond what is necessary. <p>EXERCISE 2:</p> <ul style="list-style-type: none"> ● Ask participants to list down 5 gadgets that they use throughout the day. ● Pick the 5 most common ones and calculate the annual energy consumption using the energy calculator at this link: https://www.energyusecalculator.com/calculate_electrical_usage.htm ● Based on your group's average energy consumption, reflect now on the global energy consumption/environmental impact due to our reliance on technology. ● Resolve to practice COD by reducing our usage/reliance on technology beyond what is necessary. <p>Do you know which metals and minerals are used to manufacture and power the gadgets you are using and the energy consumed to extract them and their impact on the environment? As an example, the top 10 metals and minerals which power mobile phones are listed in Attachment B.</p>	<p>https://www.energyusecalculator.com/calculate_electrical_usage.htm</p> <p>Access this site to calculate the energy consumption</p> <p>Attachment B</p>	
<p>Discussion on: Protecting the Planet –</p>	<p>How can technology help the environment?</p> <p>Our environment is unique in its ability to sustain life forms. Human evolution and the development of technology has empowered every aspect of our lives. The onus is on us to</p>	<p>Video 2: https://www.youtube.com/watch?</p>	<p>5 mins</p>

<p>A responsible and beneficial use of Technology without harming the environment</p>	<p>use this technology to help the environment and protect it from further degeneration.</p> <p>Technology can be used to monitor and facilitate:</p> <ul style="list-style-type: none"> ● Energy efficiency – from the kitchen to the desktop ● 'Green' living – adopting a lifestyle that accommodates renewable sources of energy (solar, wind, etc.) ● Vehicles that run on 'green' fuel, hybrid cars, and popular designs ● Afforestation – to prevent carbon intensive paper production and encroaching upon 'green' space ● Environmentally-friendly disposal systems for chemical waste, especially solid hazardous waste, such as e-waste, batteries, mercury-containing devices, etc. ● Climate-controlled buildings with construction designs to harness the power of the elements ● Energy-conserving home and work environments <p>The above mentioned possible changes are critical to the survival of all lives on this planet. Technology and dedicated research can help us manage and monitor energy consumption. This in turn will reduce the risks associated with a depleted ozone layer, health hazards that plague our lifestyles and even our carbon footprint.¹²</p>	<p>v=6Pif3T9bKQo (1 min 45 secs)</p> <p>Video 3 (Optional): https://www.youtube.com/watch?v=RuCeUWBr9sg (9 mins 40 secs) (Optional to play Video 3 during the study circle session due to its duration; it could be shared with the group prior to or after the session)</p>	
SUMMARY AND CONCLUSION			
<p>Closing summary of today's session and homework</p>	<p>So far, we have learnt the following:</p> <ul style="list-style-type: none"> ● Meaning of technology, evolution of technology and the advantages & disadvantages of technology ● The use of technology and its impact on the environment ● Relation between technology and spirituality ● How we can practice ceiling on desires in relation to technology. Identifying our 'needs versus wants' ● How technology can help the environment <p>Homework:</p> <ul style="list-style-type: none"> ● Discuss with your parents and elders the environmental changes that they have noticed in conjunction with technology advancement 		2 mins
<p>CLOSE</p>	<p>Closing prayer or reading. Prayer for universal peace – <i>Om Shanti, Shanti, Shanti</i></p>		1 min

Note: Ideally, there should be two facilitators for groups of ten or more participants. The first facilitator is the one who conducts the study circle. The second facilitator observes the group's dynamics and informs the first facilitator of any lethargy and confusion amongst participants. This second facilitator also conducts the opening activity (E.g. Omkar) and the sharing of insights at the end. This helps give variety to the participants, but also allows the first facilitator space to capture important feedback and learning points for insight sharing.

Attachment A

Some common gadgets and appliances and their energy consumptions:*⁴

SN	Item	Description	Cost per Year (\$)	kWh per Day
1	Refrigerator	Refrigerator using 180 Watts for 24 hours a day @ \$0.10 per kWh	157.70	4.32
2	Microwave	Microwave using 1,200 Watts for 30 minutes a day @ \$0.10 per kWh	21.90	0.60
3	Toaster	Toaster using 1,200 Watts for 0.20 hours a day @ \$0.10 per kWh	8.76	0.24
4	Charger	Mobile phone charger using 5 Watts for 3 hours a day @ \$0.10 per kWh	0.55	0.01
5	Router	WiFi router using 6 Watts for 24 hours a day @ \$0.10 per kWh	5.26	0.14
6	Television	22 inch LED-backlit LCD display using 30 Watts for 5 hours a day @ \$0.10 per kWh	5.48	0.15
7	Laptop	14–15 inch laptop that is using 60 Watts when plugged in for 6 hours a day @ \$0.10 per kWh	13.14	0.36
8	Water heater	Water heater using 4,000 Watts for 3 hours a day @ \$0.10 per kWh	438.05	12.00
9	Air conditioner	Central air conditioner using 3,500 Watts for 3 hours a day @ \$0.10 per kWh	383.29	10.50
10	Clothes Washer	Clothes washer using 500 Watts for 0.25 hours a day @ \$0.10 per kWh	4.56	0.13

*In the above table, energy consumption is determined using the 'EnergyUseCalculator' available at https://www.energyusecalculator.com/calculate_electrical_usage.htm

Attachment B

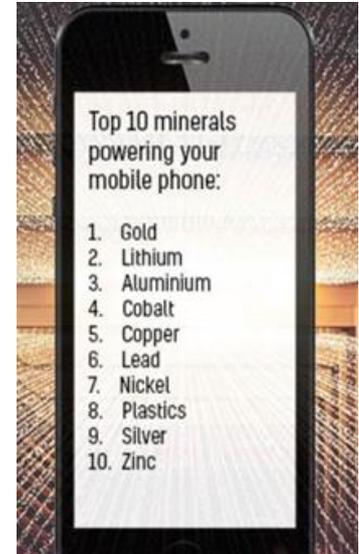
List of top 10 metals and minerals which power mobile phones.¹¹

Additional suggested homework: Find out the sources of these elements, how much energy is consumed to extract them and what the environmental impacts are.

1. Gold: This precious metal doesn't just make very pretty jewellery – it's highly prized for use in making mobile phones because it is chemically stable and conducts electricity. Small amounts of gold are used to make the mobile phone circuit board. The world's top exporter of gold is China, followed by South Africa.
2. Lithium: Can the world's supply of this soft, silvery white chemical element keep up with the huge

demand for use in electronic devices such as mobile phones? Lithium is primarily used in the production of mobile-phone batteries. It is mined from salt lakes and hard-rock ore. And the world's top exporter of lithium is Australia.

3. Aluminium: A silvery, ductile metallic element, aluminium is used in mobile phone cases and components. It is the most abundant metal in the Earth's crust and is mined in Australia, Brazil, China, India, Papua New Guinea, Indonesia, Jamaica, Russia and Suriname. The world's top aluminium producer is China.
4. Cobalt: Far from just a gorgeous, blue jewellery component, this hard, silver-white metal is used to make the rechargeable batteries in mobile phones. It is produced by smelting. The Democratic Republic of the Congo is the world's top exporter of cobalt, with almost 40 percent share.
5. Copper: Said to be the first metal ever used by man, copper is used as an electrical conductor in the mobile-phone circuit board. Most of this malleable, reddish-brown metal is mined or extracted as copper sulphides from large, open-pit mines. Chile is the world's top mine producer of copper with at least one-third share.
6. Lead: Our mobile phones would be dead without lead – it's a soft, heavy toxic malleable metallic element used in the solder that joins the parts of iPhones. Lead is produced from mined lead ore and from recycling. The world's top lead producer is China, followed by Australia and the United States.
7. Nickel: A hard, malleable silvery metal, nickel is used in mobile phone electrical connections, capacitors and batteries. The metal is extracted from its ores by heating and reducing the ore. The Philippines is the world's largest nickel-producer, closely followed by Russia, Canada and Australia.
8. Plastics: Manufactured from crude oils in the earth, heavy petrol is distilled from the crude oil and then treated with heat to create hard plastic. Plastics and fibreglass are used to make mobile-phone circuit boards, which are then coated with gold plating.
9. Silver: A soft white precious metal, silver is also used in mobile-phone circuit boards. The metal is primarily produced as a by-product when producing copper, gold, nickel and zinc. The world's top silver producer is Mexico.
10. Zinc: Said to have health benefits, zinc is a bluish-white metal; brittle at ordinary temperatures but malleable when heated. It too is used in the all-important, mobile-phone circuit board. About 70 per cent of the world's zinc originates from mining, while 30 percent comes from recycling. The world's top exporters of zinc are China, Australia and Peru.



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