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REGIONAL RENEWABLE ENERGY (A SHARMA, SECTION EDITOR)

Renewable Energy Awareness and Education in India

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Abstract Awareness is a key factor in promoting renewable energy proliferation. Although a large number of people are aware of the importance of energy and its role in the growth and development of the nation, it is also very much comprehendible that there is a yawning gap which needs to be addressed in the area of energy education and awareness in India. This paper aims to address the issue of energy proliferation strategy in India. Among Indian audiences, renewable energy and its resources have lower awareness levels. For most, energy is limited to conventional sources. People are familiar but not educated on popular energy issues. Much effort has been showered by government departments and other agencies in India over the past decade in the form of launching various schemes at school, city, and village block levels, but most these have come at abstract timings. Also, the advertising campaigns have been too heavy upon the target audiences leaving them half-baked. The paper proposes a strategic and regimented approach model towards target audiences, preparing them thoroughly before actually disseminating the knowledge package to them.

Keywords Awareness · Energy · Proliferation · Strategy · Audience

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Introduction

Energy stands second to none. For India, a developing nation (economy), the truth stands nurtured by its economic growth. The rapid rate of acceleration in economic forum is impossible without energy as the necessary quantum force. As per Central Statistical Office (Ministry of Statistics and Programme Implementation, Government of India), "Energy has come to be known as a "strategic commodity" and any uncertainty about its supply can threaten the functioning of the economy, particularly in developing economies" [1].Thus, in developing economies like India, energy holds strategic importance, qualifying to be dealt with extreme dexterity and utmost attention. Tethering to this goal, Indian policy makers have since independently strived to inculcate the energy policy and in their vision realized the importance of renewable energy as per the World Wide Fund for Nature (Formerly World Wildlife Fund), "Renewable energy (RE) has been an important component of India's energy planning process for more than four decades. The importance of renewable energy sources in the transition to a sustainable energy base was recognized way back in the early 1970s. It started with the establishment of the Department of Non-Conventional Energy Sources in 1982, which later became the Ministry of Non-Conventional Energy Sources (MNES) in 1992, and subsequently renamed as the Ministry of New and Renewable Energy (MNRE) in 2006" [2].

But with the everlasting hunger in the belly and growth as the target, it needs to have a look at more sustainable options of energy production. Marked by the apathy of the people and the shortsightedness of various stakeholders, energy sources are yet marked through the conventional items of past. Still, most of India today realizes energy as synonym to coal and petroleum.

The world is firefighting the energy crisis with new research in the areas of nonconventional and renewable energy

resources. All that has been done and achieved by the forerunners in activating the dependency shift to renewable energy sources faces a yawning challenge of dissemination. Still, a vast majority around the world needs to be educated and made aware of the need for energy shift and ways to achieve it. In India also, "Energy Awareness" needs to be enhanced significantly. Awareness is a key factor in promoting renewable energy proliferation. Communication in its various forms stands as a promise to resolve the issue. Thus for renewable energy dissemination and shift among people at large the role of awareness and communication act as lock and key, respectively.

As per Ernst & Young report—India occupies the Renewable Energy Attractiveness Index (2016) chart at number three, after USA and China, being among the top countries in the world. Several estimates have shown that India has a high potential of generating renewable energy from various sources like: wind, solar, biomass, geothermal, hydro, and marine. This is a good improvement in standing since the last report issued in 2014, where the Indian standing was at number seven. Citing that Indian scenario for renewable energy harnessing has never been better than the current times. It is here that we need to propel and foster hard the energy awareness among the stakeholders to make hay while the sun shines.

Awareness and education in the fields of upcoming technologies have been a challenge worldwide; India being no stranger in the vogue. In a general set-up, the acceptability of a technology cannot be realized unless the end users are educated and apprised well enough to be motivated to adopt and own it. Thus the biggest and the foremost challenge in communicating the energy challenge to the world is the low level of awareness about the problem itself [3].

Research Hypothesis

The survey was conducted to ratify the following hypothesis points:

H1: People at large connote a direct relation between energy and development.
H2: To most people, energy is limited to conventional sources.
H3: Renewable energy and its resources have lower awareness among its people.
H4: People are familiar but not educated on popular energy issues.

To access and mark the symbolic reflection of the "Energy Awareness" problem in India through this paper, a survey was conducted. It was a questionnaire-based survey, conducted on a purely face to face basis with the respondents. A total of 300 respondents were targeted for the survey. Out the 300 respondents,12 respondents replied partially to the questionnaire and the remaining 288 opined in total. The questionnaire comprised of a total of eight questions, which were both open and close ended in nature. Respondents were in age group of 19–48 years. The purpose of this study is to explore the energy awareness amongst the Indian common mass (stakeholders) and based on the results present a model for proliferating energy awareness in India.

Survey Results

Survey data was statistically analyzed in absolute and percentage terms for the various question asked as given underneath:

a. Relationship between energy, growth, and development of the country

During the survey, only 5 % of the respondents believed that energy contributes directly to the growth and development of the country. Nearly 51 % of the respondents believed that energy plays a "Large" role in the similar context. Out of the remaining 44 % respondents-32 % were of the opinion that energy has a "Moderate" role, while 4 % and 8 %, respectively, opined that there was scarce and no role of energy in the growth and development of the country. Bar diagram in Fig. 1 and Pie chart in Fig. 2 represents the percentage value and the absolute values of responses under various segments of the question.

b Common connotation of energy

Out of the total 300 respondents who answered this question, from of the suggestive but not limited options, gasoline topped the charts with 63 % respondents. Electricity was the second choice with 26 % favorable

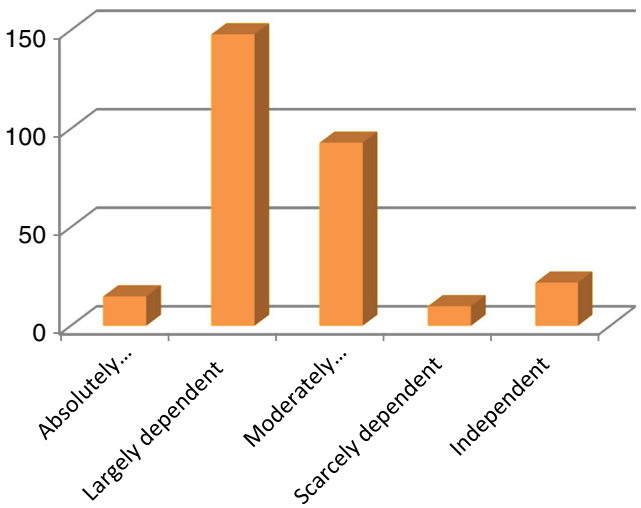

Fig. 1 Overview of the relationship between energy and growth and development of the country

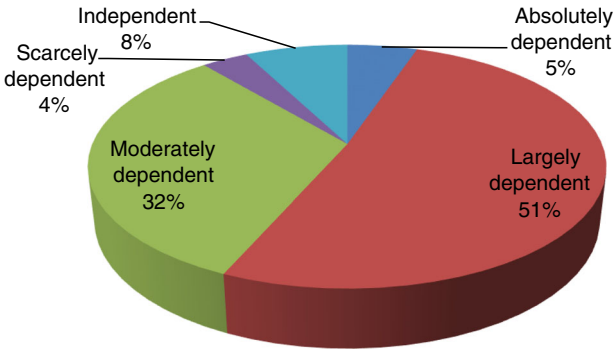

Fig. 2 Percentage overview of relationship between energy and growth and development of the country

responses, while batteries and other multiple responses pooled 6 and 5 %, respectively. Figures 3 and 4 represent the data for the question.

c. Common connotation of renewable energy.

Of the 288 respondents who answered this question, 50 % believed in "solar", whereas surprisingly "inverter" scored a very nearly 40 %. Nuclear and wind have preferred by 4 and 6 % respondents. Figures 5 and 6 present responses in statistical form.

d. Awareness about key energy-associated terms

The respondents were quizzed on their familiarity with four renewable energy-related terms. Out of the 288 respondents who responded in multiple choices, global warming was acknowledged by 35 %, carbon emissions by 21 %, biofuels by 5 %, and PV panel by only 2 %. One hundred forty-six respondents could not correlate with any of the four options and constituted an absolute 37 % of the respondents. Figures 7 and 8 reflect the respondents views for the question.

e. Correlation between energy usage and pollution. The response to this questioned rallied largely in favor of the opinion that energy use is related to pollution. Out of the total 300 respondents in this case, 64 % opines in a "yes", as compared to 23 % replying in a "no".13 % respondents were not sure about either. Figures 9 and 10 present the statistical data for this question.

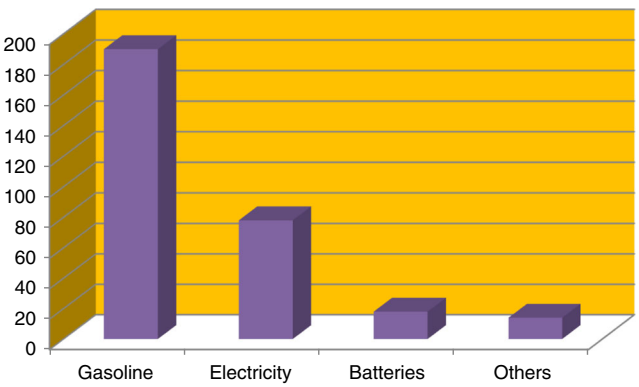

Fig. 3 Overview of connotations of energy

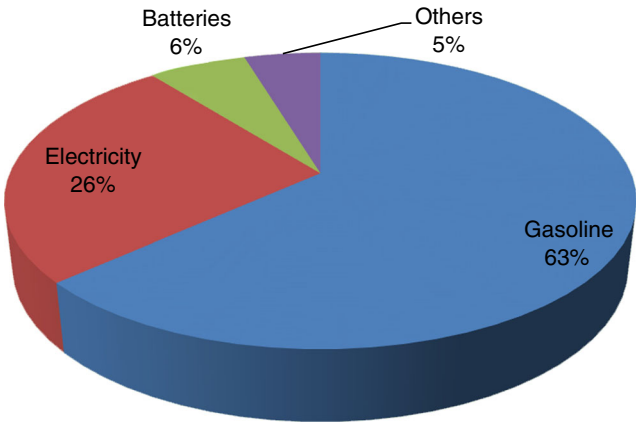

Fig. 4 Percentage overview of connotations of energy

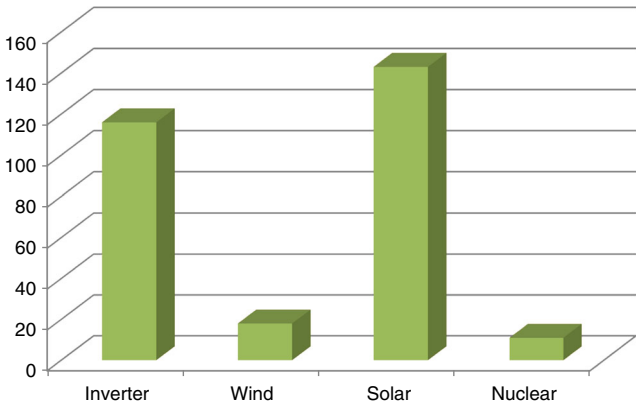

Fig. 5 Overview of connotations of renewable energy

f. Response to option to shift to other forms of energy than gasoline

An enthusiastic 64 % of the respondents showed their willingness to shift to other forms of energy than the conventional gasoline. Charting on their long-term dependence and familiarity to gasoline, a good 23 % of respondents declined to make a shift, the remaining 13 % of the respondents were unable to make their minds and hence indecisive about the shift. Figures 11 and 12 depict response distribution for this question.

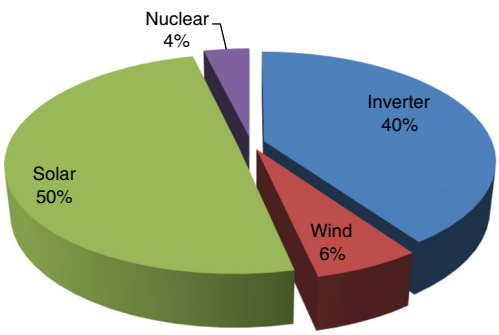

Fig. 6 Percentage overview of connotations of renewable energy

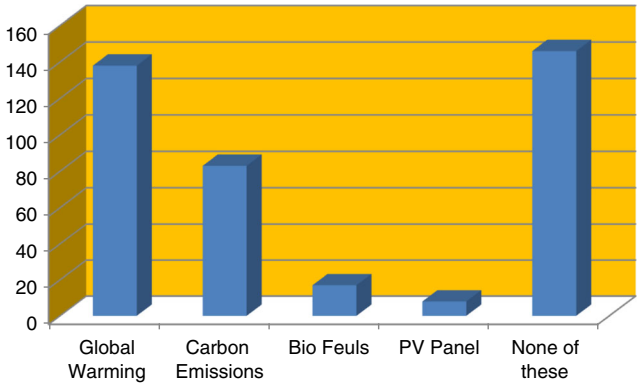

Fig. 7 Overview of awareness about key energy-associated terms

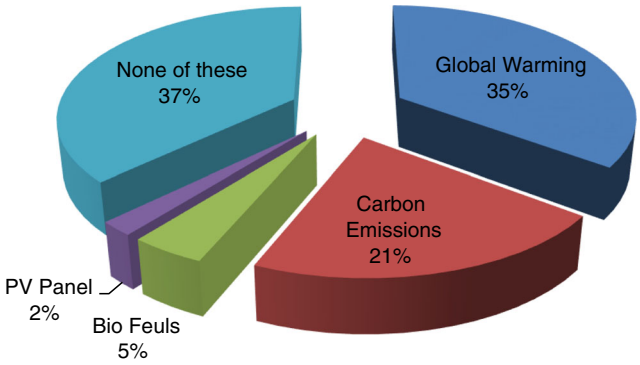

Fig. 8 Percentage overview of awareness about key energy-associated terms

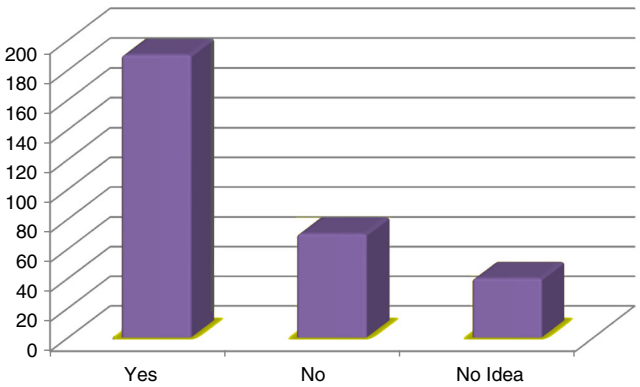

Fig. 9 Overview of correlation between energy usage and pollution

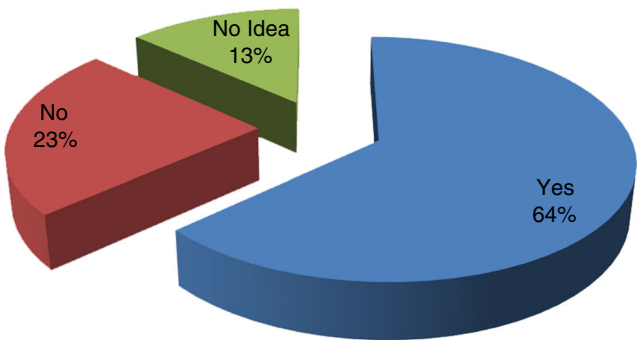

Fig. 10 Percentage overview of correlation between energy usage and pollution

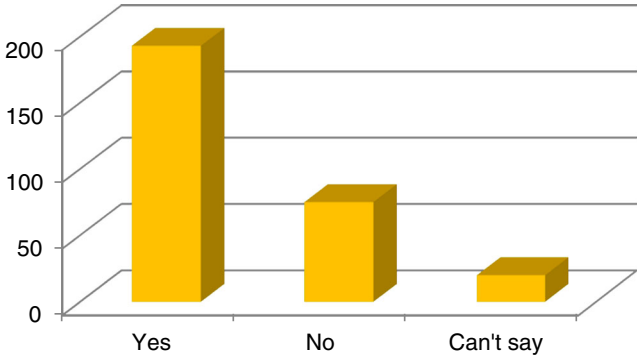

Fig. 11 Overview of willingness to shift to other forms than gasoline

g. Devote time to acquire knowledge about developments in the field of energy

Almost all the respondents intended to devote their time to getting aware and educated in the field of energy. In terms of percentage, 85 % of the participants responded in positive, while 15 % declined citing various reasons. Figures 13 and 14 present various responses for the question.

h. Use led bulbs and its importance

A total of 300 respondents answered this question. Out of the suggestive but not limited options, "They give better light" topped the charts with 38 % respondents. "They are long lasting" was the second choice with 30 % favorable responses; while "They save energy" and other multiple responses pooled 19 and 13 %, respectively. Figures 15 and 16 present the statistical data for the question.

Data Analysis

The survey results stand in testimony to the view that although a large number of people are aware of the importance of

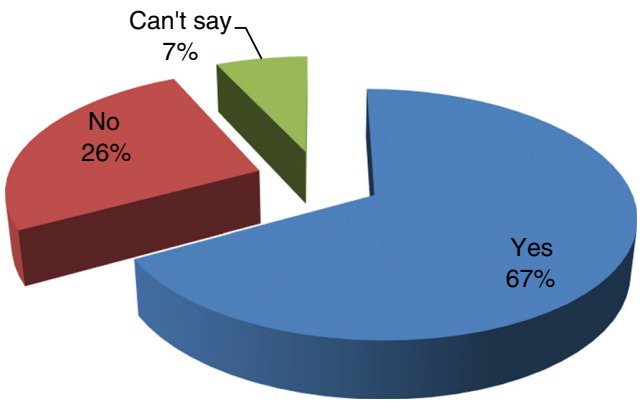

Fig. 12 Percentage overview of willingness to shift to other forms than gasoline

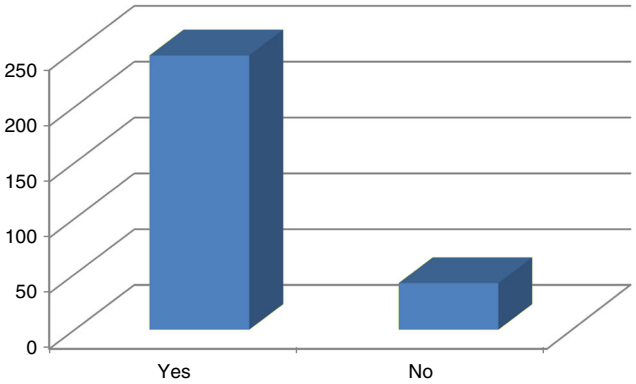

Fig. 13 Overview of intent to be aware and educated in the field of energy

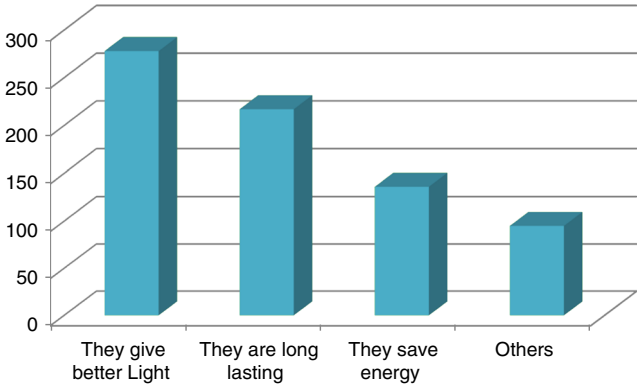

Fig. 15 Overview of importance of led bulbs

energy and its role in the growth and development of the nation, but to equally large percentage of them; the term energy stands as synonym to the conventional and non-renewable sources like gasoline and electricity only. Fighting out for a place on stage, "Renewable Energy" was linked by respondents to a popular mode-solar. The inverter was the second most popular option linked to renewable energy, which reflects that renewable energy is a term which in itself needs a wider aura of awareness and education. Much of what people know about science and related matters is by consuming mass media news [4]. Likewise, solar has been for the past few decades the most advertised and highlighted renewable source of energy in India which was reflected in the responses of the people. Same has been with the response to the "Global Warming", which was recognized as the key term since it has enjoyed wide listings to people's ears and eyes. Adding to the data inferences, led bulbs were more recognized for their bright luminescence and better life cycle rather than for their ability as being energy efficient tool. There is no doubt that the results generated by responses trigger an understanding that people at large have a rough idea in some way about energy, courtesy from media. Also important to note here is that although the role of media has been identified as that of a key player in forming public perception, it has also been observed that there is a failure in the communication of science to the public by media worldwide [5].

Hence, though it seems that people may have acquired some knowledge about renewable energy and related issues through media, it is also very much comprehensible that there is a yawning gap which needs to be addressed in the area of energy education and awareness in India. But a silver lining exhibited through the data results is that the stakeholders are willing to learn, switch, and participate in energy awareness and education.

General vogues in such efforts are rapid advertising campaigns, which targets audiences in similar tastes, disregarding their diversity and advents. These untargeted data bombings do not help to take the cause a long way. Often dipping and diving after delivering, the primary thrust of familiarity to the issues important to the cause of energy awareness and its proliferation. This familiarity is developed as the case of mistaken identity. Whereas, it bears resemblance to the scenario that people have acquired the required set of knowledge but falls miserably short of the goal. Implementation of media and various advertising strategies should thus be well integrated, complimented and reinforced by other ground activities impelling stakeholder participation and partnerships [6]. This calls for more particular and regulated approach to deal with the issue of disseminating the cause of energy awareness in India.

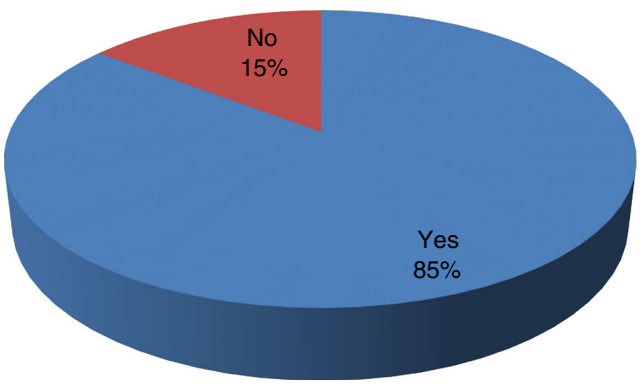

Fig. 14 Percentage overview of intent to be aware and educated in the field of energy

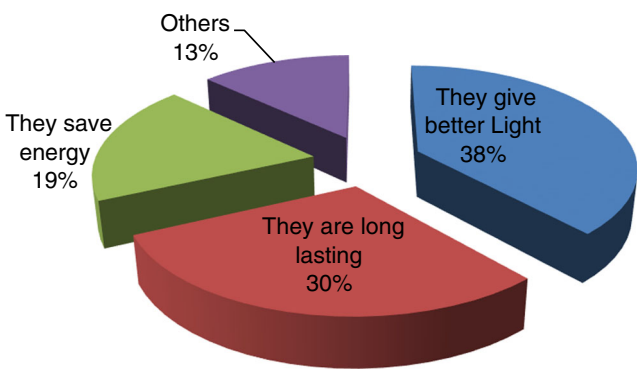

Fig. 16 Percentage overview of importance of led bulbs

Sensitizing with the audience is also a great challenge in this field and should be handled with care. India is a land of diverse cultures and religions, which is further subjugated by economic and social disparities. Keeping the concerns in view, such wide-scale-message creations and proliferations need to be sensitive to cohesive cultural opinions and ways of life [7, 8]. Secondly, it is often seen that audience is treated as a homogeneously distributed entity. As celebrities, politicians and scientists are pitched in for the role of brand ambassadors to acquire a credible and popular approach among audiences; promoting such issues of social importance at hand, but this need not be the case with all. Often, the case is that youth vantage role models, such as parents, teachers, and friends can easily correlate with them [9].

Entertainment and education is an important approach which tends to supplement the goal of educating and encompassing the audiences for gaining willful submission to capitalize upon the popular appeal of enchanting and convincing them towards healthier, safer and happier lives [10, 11]. Looking at entertainment–education, it can be seen as the process of purposely designing and implementing a message to both entertain and educate, also to increase audience members' knowledge about an educational issue and also create favorable attitudes, and change overt behaviors [12]. The paper proposes to eradicate the core barriers of:

1. Generalized message formulation for wide and diverse spread of Indian audiences, and
2. Non-prepared/non-conditioned set of target audiences, as the major issue in achieving energy awareness and education in India through a comprehensive plan model.

Proposed Model

The proposed model (Fig. 17), subscribes to a regimented approach for proliferating energy awareness and education among Indian masses. Ideally, considering audiences, the ones for whom the message is addressed to, should be tailored. Message formulation and dissemination, in the communication process, is often taken as the end activity of the process; assuming the audiences to be passive and inert [13]. Pre-eminently, the target audiences must be considered to decide upon the types of media tool used and the message delivery approach to be adopted [14]. As compared to the popular approach of fitting the readymade message to the audience gives birth to various crucial anomalies by resulting in people who are half-baked and people who may have become aware but not educated. As has been normally observed and felt, people are exposed directly to the secondary step of imparting knowledge, drowning them in the web of data which makes little or no sense to them at times.

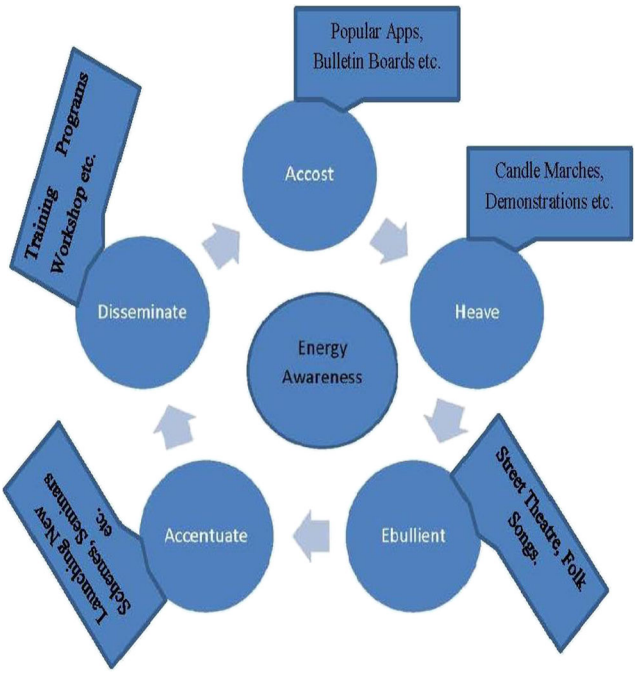

Fig. 17 Strategic model for preparing audiences towards energy awareness and education

Also it has been noted that for a behavior to be adopted by an audience, there needs to be the following set of agreement: (a) intention for the behavior, (b) heuristic appetite towards such a behavioral aspect, (c) equally important is the occurrence of belief that others approve of the behavior, and (d) finally, trust and an expression of self-control over such a behavior [15]. Hence pre-preparing the audience and making them ready to imbibe the delivered knowledge forms the first step and therefore an important part of the strategic approach in this matter before finally exposing them to the core dissemination of the message, knowledge—the second step.

In light of the argument, the paper proposes a two-step model to achieve the aim. Stage1: is framed through the first four steps of the proposed model and adheres to the spirit of pre-preparing the target audiences for the purpose of education and awareness, while Stage2: comprises of the fifth and final step which caters for the final chant of knowledge dissemination to the audience.

The strategic model proposes a five-step cycle, which is spelled through the acronym AHEAD—A, accost; H, heave; E, ebullient; A, accentuate; D, disseminate. The acronym: "AHEAD" teams through its various motives for embarking the energy awareness dissemination. A—Accost: Forms the first step of the strategic model. It aims to initiate and build a dialogue and approach and address people (audience) in a fast catching but affirmative tone; making the audience hooked on to the basic issue, rather than loading them with information. It is a kind of teaser, viz. popular apps, bulletin boards, community meetings, etc., which would be followed and supplemented by the

second step. H—Heave: Is adorned as the second step of the model. It capitalizes upon the engagement attained, through the first step. Herein, the audience engagement is further bloomed and pulled to be brought up to reach to the hilt. This step is driven by mass activities like candle marches, demonstrations and religious appeals, etc. Target audiences are fostered to be ready, active, devoted, and committed to receive the message. E—Ebullient: The sense of a commitment to be ready and receive needs to be complimented by a fair quota of energy, fervor, and excitement. Such that less effort is needed for the audience to correlate and remember after they are over with the session. Pooling energies is done through street theatre (Nukkad Natak), folk songs, public acknowledgments, etc. A—Accentuate: The delivery of the message should start and be done in a noticeable and prominent manner, cleverly accruing upon the build—a combination of willingness and energy which has already been set as the perfect cradle for proliferating awareness and education. This step is supplemented by activities like launching new schemes, seminars, talks, etc. D—Disseminate: Celebrates the final stage of the model where the target audiences are now prepared for a final execution of the tailored material for spilling the seed of energy education and awareness through crafted technical messages. This step is served by activities such as training, symposiums, workshop, etc.

Conclusion

Energy awareness is a crucial and potent aspect of achieving the goal of achieving energy sustainability and development in India and the world as well. As per Central Statistical Office (Ministry of Statistics and Programme Implementation, Govt. of India): "Achieving energy security in this strategic sense is of fundamental importance not only to India's economic growth but also for the human development objectives that aim at alleviation of poverty, unemployment and meeting the Millennium Development Goals (MDGs)" [1]. India being one of the important players in the area needs to put sustained efforts in this regards. The policy makers should target mobilization of a large range of intervention platforms for the primary as well as the secondary stage of proliferating awareness and education in India. Because as enumerated by the social cognitive theory of Albert Bandura, behavior is not imbibed in an isolated milieu, rather it actually realizes by imitating other models [16]. Vital choices in adapting such intervention platforms could include: community meetings; training or sensitization sessions with traditional authorities, community, or religious leaders; street theatre and other cultural activities; and marches and demonstrations [6]. Developing apps could also help in engaging and preparing the audiences for further interlocution.

The contemporary scenario of life today has grown more demanding both professionally and domestically, calling for the creation of windows to educate the stakeholders. As Confucius (circa 450 BC) said, " Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand". Involving, connecting, and participating altogether makes a very astounding experience for the stakeholders to reap; cultivating a sense of ownership within them [13]. Thus the policy makers should engrave the strategy such that the stakeholders are not just told or informed but readied, involved, and made to participate in the act. Ernst and Young in its report have pointed out that "Policy-makers must carefully deploy a range of measures to achieve long-term investment rather than short-term goals, often motivated by political objectives" [17]. It is utmost important to foster a concrete image in the minds of the audience so as to accrue long-term behavioral mentoring amongst the intended audiences to harness the goal of energy security and sufficiency.

Compliance with Ethical Standards

Conflict of Interest Saurabh Mishra declares that he has no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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