

16.02 hrs.

**MOTION RE: REPORT OF DEPARTMENT OF ATOMIC ENERGY**

**Shri D. C. Sharma** (Gurdaspur): I beg to move:

"That this House takes note of the Report of the Department of Atomic Energy for 1960-61, laid on the Table of the House on the 7th August, 1961."

I am rising to initiate a motion for the discussion of the report of the Atomic Energy Commission for the year 1960-61. I feel a great deal of pride in what has been achieved by this Atomic Energy Commission during the span of a few years. It is said by some persons—and they are very ill-informed persons—that this atomic energy establishment is for us nothing but a symbol of prestige. It may be like that in some ways, but I feel that to look at it from that angle is not to do justice to it. After all, India cannot lag behind other countries, so far as scientific development is concerned in the age of science and technology, (and some persons call this an atomic age). It would have been disastrous for India not to have done something to make ourselves familiar with the techniques of atomic energy and not to have done something to give our scientists some idea of what this atomic energy is and what are its potentialities for good and evil.

There are some persons who feel that this Atomic Energy Commission is a symbol of power for us. I think no one has done worse in this matter than the Foreign Minister of Pakistan. Speaking sometime back, he said, "We must have atomic power stations, because if we do not have them, the balance of power between India and Pakistan will be disturbed". I would submit very respectfully that India does not look upon the atomic energy establishment as a source of power, as something that is going to be used as a weapon of power against anybody.

Speaking at the National Development Council on January 14, our Prime Minister said:

"Under no circumstances will this country embark on a nuclear weapons' programme, whatever might happen."

I think these are unequivocal words. These are very authentic words, as they come from the Prime Minister of our country and I feel that anyone who looks upon this atomic energy establishment as a source of military power or as a source of armed strength is utterly mistaken. Of course, atomic energy does mean power, but power of a very beneficial kind for our country.

Some time back our Defence Ministry held an Atoms for Health exhibition. Why was that arranged? It was done so that our countrymen should know that we are going to make use of isotopes and other things for medicinal purposes and for curing some of these ills to which humanity is prey. At that exhibition our intention was made very clear. It was said:

"If the present rate of atomic tests continues, all fall-out from nuclear fission will have been absorbed by the earth in ten years and they will reverse the sex ratio of birth. There will be more women than men. More abnormal children will be born and internal physiological disorders will increase steadily in both sexes."

This was the warning that was given. It was a kind of challenge thrown to those persons who try to use atomic energy as a source of power.

I know that much is being done in the world today. The world is alarmed at the developments that are taking place in the field of atomic energy. The other day, the great Prime Minister of the Soviet Union talked about a bomb which his

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scientists were able to manufacture, but which he did not allow them to manufacture. We have the nuclear test ban talks, which have been deadlocked so many times. There are powerful movements in U.K. and other countries which are being launched in order to stop the production of these nuclear weapons, because nuclear weapons mean nuclear war, which is a very very dangerous thing. The destructive power of the atom is well-known. All the world and humanity feel frightened when they think of the incredible power of the atom for annihilating humanity and for doing great damage to the world.

But I take relief by contemplating on our own atomic energy establishment. We do not talk of bombs—neutron, atomic and hydrogen bombs. The Chairman of the Atomic Energy Commission once said that we can manufacture atom bombs in two years. It does not mean that we are going to do it. We are not going to do it. I feel relieved when I find that our Atomic Energy Commission is meant for peaceful purposes, for those constructive ends which can brighten the lives of the people in our country and all over the world. That is the thing which makes me happy.

When I go through the report of the Atomic Energy Commission I find that there are many things in it which are gratifying to me, to a citizen of India. It is true, Sir, that the report is written in a highly technical language and that cannot be helped and a layman finds it difficult to follow it. But there is no doubt about the facts. To use the words of Mr. Churchill who came to India at the time when the Canada-India Reactor was inaugurated, he said that "atomic energy has come of age in India". I think, these words as they come from a foreign observer who himself is interested in this kind of development are very heartening. That we should have come of age in this development in such a short time

speaks very highly of the scientists of our country, their technical knowledge, their scientific acumen and also of their organisational capacity. All these things show that we are doing very well in this line.

We have three reactors. One is Zerlina. I feel happy to say that it has been wholly designed and erected by Indians. It uses natural uranium as fuel and is moderated with heavy water. I feel happy to talk of uranium in this connection because our uranium resources are in the neighbourhood of about 30,000 tons. Of course, we have not yet explored the deposits in Rajasthan and when we make a survey of those deposits I think we will be able to find more. This Zerlina is an experimental reactor on account of its flexibility and it is very helpful for lattice experiments and oscillation experiments. Those experiments are going to be of use not only to my country but also to the countries of South East Asia and also to other countries. After all, our Atomic Energy Establishment does not live in isolation from the rest of the world. It is a member of the International Atomic Energy Agency and a member of several other international bodies. There is a regular exchange of know-how between our country and those countries. Therefore, whatever big or whatever fruitful is done by the Atomic Energy Establishment is the common knowledge of those persons who are interested in atomic development in the world.

Now, we began with Apsara which worked 18,000 kw hours in the first year, 1,60,000 kw hours in the second year, 6,43,000 hours in the third year and about a million kw hours in the fourth year. I think this Apsara gave, if I can use that word, a magnificent performance. It has provided India with the facility necessary for designing and building her own power reactors. In fact, as it was said by a foreign visitor to my country, it has led to a minor revolution in agriculture, industry and medicine on ac-

count of the radio isotopes which are being manufactured there. It has also been irradiating food so that some of the pests are destroyed.

Now we have the Canada-India Reactor. The Canada-India Reactor, to use the words of a very eminent person, is a symbol of international co-operation, and that reactor is going to be a very fine source of research and experiment so far as atomic energy is concerned.

There is one thing to which I want to draw the attention of the House. It is true that all these reactors are going to enable us to develop fundamental research in physical, chemical, biological and metallurgical problems relating to atomic energy. It is true all these reactors are going to help the training of our scientific personnel. It is also true that we are going to have radio isotopes which can be used in medicinal purposes. All these things are there. But I would submit very respectfully that atomic energy is a very very costly thing, a very very expensive thing. Fabulous sums of money are being spent by other countries on this. They are doing all that they can to make the atomic energy establishment as up-to-date as possible.

I have been, Sir, comparing the research programme of the Indian Atomic Energy Establishment with the research programme of the United States Atomic Energy Commission. I feel to compare one with the other is very unfair. This report was produced in 1961. I think it is not fair to compare this report with the 1960 report that has been brought out by the Atomic Energy Establishment in my own country. But I cannot help saying that there are certain aspects of research which should be looked into much more than they are being done now. For instance, medical research, research concerning radiation, research concerning environmental things, research concerning high energy physics and, more than anything else, research concerning metallurgy require more attention.

I feel that so far as metallurgy goes we do not make a very good showing. Of course, as I said in the beginning, our resources are limited. But, all the same, there is some kind of pilot projects in all those aspects of research which should be set up here and which is being done in other countries. I do not want my country to lag behind any other country so far as this is concerned.

Then there is the problem of setting up, what I may call, our industrial reactors. From experimental reactors we will now go in for industrial reactors. I know we have already got a project to set up an atomic reactor at Tarapore. I know that every State in India is trying to have an industrial reactor of that type. I know that.

**Shri Braj Raj Singh** (Ferozabad):  
Punjab too.

**Shri D. C. Sharma:** Punjab is also making a claim for that. Delhi, Madras and other areas are also trying to have industrial reactors of that kind.

A lot of controversy has been going on about the economics of power production through atomic energy and through coal and other sources. I know there were some editorials on this subject in some of the Indian papers where it was stated that power production through these reactors will be very very costly and will be uneconomic. Now, I am not a technical person and I cannot say much on this point, but I know that the Chairman of the U.K. Atomic Energy Commission, Sir Rogers Maikins, has stated that the cost of nuclear power in U.K. would fall below the cost of conventional power at the base haulage at the end of the decade. So, I do not see any reason why this should not be true in our case also, especially when we have to haul coal to such long distances. Anyhow, I would request the Prime Minister to produce a White Paper which can give us some idea about

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the economics of this. After all, this subject has been under discussion for a long time and we have to come to some firm conclusions by this time. I hope that something will be done to enlighten the people. Otherwise, people will think that atomic energy is only a show-piece and it is not going to be of common utility in this country.

A lot of research has been carried on in the atomic energy establishments. I know that two centres are going to be opened, one in the north and another in the south called university nuclear centres. I feel that these two centres are not enough for a big country like ours. We should have at least four centres in all the four directions of the country so that our country can profit by it.

**An Hon. Member:** Sir, no hon. Minister is present in the House.

**Mr. Deputy-Speaker:** I am aware of it.

**Shri Braj Raj Singh:** He does not require any listening.

**Shri D. C. Sharma:** Then we should place more funds at the disposal of the Atomic Energy Commission during the Third Plan than we have so far provided. If that is done, the work can proceed on a better basis. At the same time, we should try to have some small atomic energy stations to carry out experiments so that we can get experience of this kind. With these words I would commend the Report of the Department of Atomic Energy for the year 1960-61.

**Mr. Deputy-Speaker:** Motion moved:

"That this House takes note of the Report of the Department of Atomic Energy for 1960-61, laid on the Table of the House on the 7th August, 1961."

**Shri Naushir Bharucha** (East Khadesh): **Mr. Deputy-Speaker,** the

purpose of my speech in the House today is to attempt to set at rest a controversy which has been raging in the press and elsewhere that India is pouring her hard-earned foreign exchange, as well as her internal financial resources, into a venture which more scientifically advanced countries have abandoned. I am sure, the House is aware of the fact that in the press criticism has appeared that whereas countries like America and England have slowed down their projects of producing electricity by nuclear generation, India, which is supposed to be a backward country and in need of foreign assistance, should not indulge in this luxury. Sir, it is necessary, therefore, to have some idea as to the economics of nuclear generation of power, and if we can succeed, if this House can convey not only to this country but to all those who criticise us here and abroad the fact that this House has decided on going on with the programme of power generation by atomic energy, then I believe a great purpose would have been served by our debate.

In calculating the power cost of generating electricity it is customary to divide the costs into certain components. Electricity cannot be stored, at least in large quantities, and has to be consumed the instant it is produced and, therefore, the component which enters into the price of generation is that component which is attributable to the capital cost of the plant. There is another component which is known as running charges, which depends upon the output of electricity generated, that is the quantum of electricity generated. The third component is transmission and distribution charges. So far as transmission and distribution charges are concerned, they are common whether electricity is generated by nuclear power or it is generated by conventional methods. Therefore, the only difference that can arise is the cost of electricity generated and transmitted up to the busbar of the generating station. In this connection, I would

perhaps give to the House certain very interesting figures. In thermal generation, the cost of fuel, namely, coal is a very important item, and often coal accounts for as much as 50 to 60 per cent. of the total cost of generation. Therefore, the question of the price of coal assumes an important aspect, as also its cost of transportation. Having regard to the conditions now prevailing in India, where coal has to be hauled over long distances, and having regard to the present price of coal which ranges anything from Rs. 46 per ton to Rs. 55 per ton, depending upon the distance over which it has to be hauled, it will be found that in order to generate 1 kw hour of energy, at the rate of Rs. 55 per ton of coal, 2.74 nP. would be the cost of fuel consumed for producing that 1 kw hour.

But, unfortunately, as the House will have seen it is not merely that coal is transported by rail but often it is transported by sea as a result of which an additional subsidy has to be paid for transportation of coal. The House will have occasion to deal with this question when we deal with the Supplementary Grants where Rs. 2½ crores of additional grants are being asked for from the House to subsidise sea transport of coal.

When we take these facts into consideration the surprising thing is that with that subsidy the price of coal delivered in Bombay and discharged at the docks comes as high as Rs. 95 per ton. Bearing in mind this fact that the cost of coal plus the enormous and the ruinous transportation charges which this nation has got to pay and which pushes up the price of coal to Rs. 90 or Rs. 95 per ton, it would mean that the cost of generating one kilowatt hour, so far as fuel alone is concerned, would come to 4½ nP per unit. Mind you that it is only that part of the cost of generation, namely, the fuel which will come to 4½ nP per unit. The overall cost which we may take, that is, the cost of capital investment plus what is known as running charges com-

ponent, will be 5.86 nP or very nearly 6 nP or one anna a unit for thermal generated energy.

As against that, what are the corresponding figures for nuclear generation? The first point to bear in mind is that nuclear generation differs from thermal generation mainly in the fact that fuel is utilised there is very costly in the beginning so far as capital cost is concerned, but there is no daily feeding of the furnace as happens in the case of thermal generation. Once you have invested by way of capital expenditure in the fuel that you insert in the reactor, that fuel gives a certain length of service. Therefore those fuel charges in the case of nuclear generation will come to 1.38 nP. per unit as against 4.48 nP. per unit in the case of coal transported with subsidy and delivered at Bombay Docks.

Why have I taken Bombay Docks? It is because Bombay is nearly 1,000 miles away from the coalfields. But Bombay is a huge power consuming centre and I think it would not be improper to take Bombay as a point in instance as the new nuclear power generation plant is also going to be established only a 100 kilometres away from Bombay City. Therefore when people talk that nuclear generation is costly, expensive and ruinous, they forget the fact that between the fuel cost of producing one unit in the case of thermal plant and the fuel cost of producing one unit in the nuclear plant, the latter is far less than the former. Of course, the capital cost in the beginning has to be taken into consideration. But the capital cost also has to be provided for ultimately by setting aside certain sums for depreciation, repayment of capital and so forth. Taking everything into consideration we find that whereas in the case of thermal generation, in the case of Bombay that I cited, the overall cost, that is, including the cost of coal plus the capital cost of supplying the plant plus the running cost, the unit would cost 5.85 nP in the

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case of nuclear energy it might only be round about 4 nP. I am prepared to concede that in the initial stages it may be that because we are venturing into a new experiment and on account of the fact that it is very difficult to foresee each and every capital equipment required from the very start and certain modifications and enlargements may have to be made to our nuclear plant as a result of which perhaps the cost of nuclear generation might rise by one nP. per unit more. But even then the broad fact that emerges from this analysis is that the cost of electrical generation by the thermal method, particularly in areas remote from coal centres, and the cost of generation by nuclear methods can compare favourably.

It has been suggested by the critics that the cost of generation by conventional methods is falling fast. No doubt, it is so. In the last few years these costs have fallen by 25 per cent. on account of various reasons, such as, improvement in the technique of building up new thermal stations and utilisation of higher steam temperatures and pressures. But then what is forgotten is that whereas the capital cost per kilowatt of thermal generation is falling, the capital cost per kilowatt of nuclear generation is falling faster. What the critics of our policy do is that whereas they point out the fact that there is a fall in the capital cost of thermal generation, they quietly do not mention and slur over the fact that the capital cost of nuclear generation is falling faster. I may just mention to the House how fast capital costs are falling.

Four or five years ago for the Berkeley station in England which had two reactors with a capacity of 275 megawatts, the cost per kilowatt was £160 and for the last one in Dungeness, which has a capacity of 550 megawatts the capital cost has come down to £110 per kilowatt of energy. In other words, the cost has been reduced in these five years from £160 to £110 that is, roughly by

about one-third. Therefore the fact remains that with the technique of generation still improving, it is expected by experts that it is likely to become cheaper still. I have got here a leaflet entitled, *The Nuclear Power Programme*, issued by the British Government in June 1960. The experts prophesy that for stations designed today conventional power costs are about 25 per cent. less than nuclear costs in the United Kingdom, but the Government is advised that the nuclear generation for base load purposes is likely to become cheaper than the conventional generation by about 1970. But here we have got to notice one fact, namely, that England is a small country comparatively. I think the entire Great Britain was one-fifteenth of undivided India. Therefore the question of haulage of coal does not feature prominently there. Coal is practically available next door to the generating station. Therefore their thermal cost naturally falls quicker. But in our case, I am sure, even from the very start we would be in a favourable position to compete with thermal power stations.

It has been stated that India is indulging in this luxury of producing electricity by means of nuclear generation while other countries are abandoning it. I am afraid the facts are totally different. Take for example, England. In England in 1955, when Britain first put forward the programme of nuclear generation, the then experts felt that a total output of 1,500 to 2,000 megawatts of installed capacity would serve the purpose of Britain's growing industry till about 1965. But then in 1957, partly on account of the fact that there was the Suez question, Britain realised for the first time that she could not be too much dependent upon oil for the purpose of extracting power in cases of emergency like that. They immediately stepped up nuclear power generation and decided to have stations with total capacity from 5,000 to 6,000 megawatts. Mind you, it is not that they have lessened their programme:

they have enlarged their entire programme three times the original size. Of course, they said that the time for executing it would be extended from 1965 to 1967 or 1968. The time will have to be extended if you go in for a much bigger programme.

Therefore it is completely wrong to assert that other forward countries, advanced countries, have been reducing their power programmes and that India should not go in for it. I submit that there is absolutely no truth in these observations, and do not understand why this propaganda is being sustained. And if my speech here today helps in a small measure to remove this misapprehension I am sure the purpose of this debate will have been more than achieved.

The second point that I desire to make is that in the matter of nuclear generation one has not to look only to the economics of generation in terms of rupees and naye Paise; because here we are dealing with a totally new source of power which has got unprecedented advantages and benefits which no other known source of power possesses. For example, if we develop small types of reactors which are capable of use in marine propulsion, what would be the result? We would be able to have ships which can move about for months together without refuelling, a very important and useful advantage for a country like India which has got few ships and a huge coastline of 3,500 miles.

Then there are various other advantages. For instance, nature has blessed us with a vast amount of thorium, monazite sand. That is available. How are you going to make use of it? You cannot burn thorium in an ordinary grate or fire-place. You have got to have a special type of fire-place, and that is the reactor.

Our programme envisages, so far as electricity generation is concerned, that we shall be having our production in three stages. The first stage

will be when natural uranium will be utilised as fuel and we will produce plutonium. Plutonium is very necessary in this stage for the ultimate utilisation of thorium, of which we have plentiful supply.

Then second stage will be when we employ reactors, using plutonium as fuel and thorium as fissile material, producing both power as well as converting part of the thorium into a material known as U-233. That is also a product which has to be used in the third stage.

And when that product is used in the third stage with thorium—because you can use thorium only in conjunction with U-233, then it is possible not only to obtain electricity but to have larger supplies of U-233.

In other words, atomic generation is the only method in the world by which you can breed more fuel by burning a part of it. There is no other known source where fuel which is placed in the reactor is increased at the end of a particular period. That is what we call breeder reactor, and that is one of the main advantages why we must go in for atomic energy, because then it enables us to be absolutely self-reliant on our own fuel.

I therefore submit that having regard to the fact that nuclear generation affords us certain advantages which no other source of power can afford, it is very necessary that India should go in for it.

In this connection I have to make one suggestion. When we say that plutonium has to be first generated in the first stage by using natural uranium, there is no known method by which you can accelerate production of plutonium; because in nature certain fissile materials disintegrate at a particular rate and you cannot accelerate or decelerate that rate. But I submit that if we are going to expedite our power programme we have got to think of importing plutonium in sufficient quantities to allow us to

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get on with the first stages as early as possible. I do not know whether other nations would be prepared to export it; that is a different thing. But if we can in exchange, let us say, for monazite or thorium, get this useful fuel, I am of opinion that foreign exchange should not be regarded as an insuperable obstacle in acquiring this very precious commodity. I feel Government might look into this matter more closely.

I am very happy to note, as regards the criticism, a criticism which is not based on any facts or figures at all—and I do not know how it started in the first place—, I am glad that Government is not being deterred by this criticism and has taken up a programme of having more atomic power stations, and a committee has been appointed to suggest sites. In the first place, a joint study is being made by Canada and India for finding out what would be the cost of building in India a Canadian type of reactor. When that is done I am sure we shall be able to push forward that programme. But over and above that, because requests have been received from various States that some sort of atomic power plant should be located in their areas, a committee is going into and trying to find out the various sites. The terms of reference were that at least six sites more for atomic power stations would be found out by it. Of course, it does not mean that we are immediately going to launch on the programme. But from what I have said with regard to the economics of generation of electricity, pointing out how in regions remote from the coal centres even today in the initial stages nuclear power can compete favourably with thermal power, I am of the opinion that Government should proceed with their programme without the slightest hesitation; and, subject to funds permitting, they should expand it as rapidly as possible.

I may state in this connection that even assuming for a moment that the

cost of nuclear generation is very heavy, there are today industries which are prepared to take power at a rate much higher than the cost of generation even by normal thermal methods. I do not have any fear of our failing to dispose of the power, namely 300 mega-watts, if we are going to generate that much.

In conclusion, I would say this, as I said at the commencement of the debate, that the purpose of this discussion would be served if we declare unequivocally to the world outside that India is irrevocably determined to proceed with the programme of power generation by nuclear methods. If this assurance is given by the hon. the Prime Minister and he makes a firm declaration of that policy, I am sure what with the facts underlying this criticism and this controversy and what with the determination of the Government, we all will be set on a firm road to a new era when nuclear power generation will be plentiful and power shortage or power famine would be a nightmare of the past.

**Shri Surendranath Dwivedy** (Kendrapara): Sir, I take this opportunity to pay a tribute to the scientists who are working under the auspices of the Atomic Energy Commission and by whose work and achievements we have earned international prestige in the atomic world. I do not want to go into the controversy. It is right and proper that India has emphatically declared, we may have power, we may have capacity to manufacture nuclear weapons, but we are not going to do that, come what may. That is in conformity with our policy of peace and the traditions of our country. But, it must be known, it must be understood that if we want that this country should give or this Parliament should give more money for this purpose, the peaceful effects of it must be known to the public at large.

It is admitted that probably there is much more necessity in an under-



developed country like India for this sort of energy than in highly industrialised countries. We in this country are interested in knowing how far this energy would help us in augmenting our production in industry and agriculture and how far the researches would be able to mitigate the sufferings of our people who fall a victim to many types of diseases which have no cure.

A point has been raised that although the necessity is realised that at this stage, we are feeling that there is shortage of coal and coal is concentrated in one part of the country and making use of this energy, we would be able to have more industries in non-coal areas, at the same time, as has been pointed out by the previous speakers, the economics of this has been questioned. We have from the authority of no less a person than Dr. Bhaba that the capital investment for an atomic power station would be much lower than the capital investment in coal mines, etc.

**An Hon. Member:** He has not said so.

**Shri Surendranath Dwivedy:** He has said so. We would like to know whether the Planning Commission or the Atomic Energy Commission has worked out the economics or they are in a position to tell us what is the actual fact.

I was very much heartened when I read in the report for 1960-61 on page 36 where it is said that researches made at 30 places have brought out that the yield per acre of rice can be increased by radio processing to the extent of 21 per cent. This is from this report. I would like to know when these processed seeds would be made available for the use of the farmers in this country in a large scale. We would also be very interested to know how far we have been able by our researches to find out any remedy so as to kill pests and insects that eat away our rice fields. I think that in this country

the production of rice is very much hampered on account of pests and insects. Therefore, on these two things, I would like to know what further progress we are making or what efforts are being made to see that the researches are really helpful to the people because then alone we shall be able to remove the fear from the minds of the people. Atomic energy has been ushered into this world with a feeling of fear and terror among the people. The more we develop this, it will lead to sure destruction, as it has come as a symbol of destruction of our civilisation.

I would like also another point to be clarified. We were assured, in the report for the year 1959-60, of a supply of uranium metal totalling about 400 tons in this country which it has been stated will serve for more than ten years as the annual replenishment for India's first atomic power station. I would like to know what progress has been made in this respect, how far we have been able to find out new fields. I also see in the report which is under discussion that some researches are going on on the survey at Bhindar in Rajasthan. I would like to know what the result of those researches and surveys is.

In conclusion, I would like to emphasise the point that whatever may be our achievements, and whatever we may aim at for the future, there is no doubt that if people are convinced of the utility of it, they will not grudge giving more money. But the scientists who are working in this establishment should, according to me, be given more facilities than we give to the defence employees of our country. They are doing a job for the future, which will usher in a new age and which will revolutionise the whole society.

We have an establishment here in Delhi called the Atomic Minerals Division. We have to pay a tribute to Dr. Gohsh who was the director, and who died in June, 1960, while on active duty. Since his death, this division is going on without a director, although

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I am told that the geological adviser of the Government of India is in charge of this division. But, probably, he may not have the time to look into the affairs of this division as fully as a full-time director would do. I want to know whether any director is going to be appointed, and if so, when.

I am told that the scientists who go for work in inaccessible areas have to do the field work for eight months, whereas scientists working under the Geological Survey of India and the Oil and Natural Gas Commission and the Indian Bureau of Mines have to work for six months, because according to them, May and June months are totally unsuitable for their work. I am also told that these scientists are not permitted to go in groups as they do in other departments.

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I am also told that there are scientists working in this department for more than 8 or 10 years who have not got any promotion, even when they are eligible for occupying higher posts not only in the department but in sister departments. Their applications for higher jobs in the sister departments have not been forwarded. So there is a feeling that even though they may work hard, whatever meritorious achievements may be to their credit, they would not have any scope for promotion. Of course, scientists should not complain about salaries, emoluments etc. They are doing a patriotic duty. At the same time, this aspect must not be ignored, that they must be given proper facilities to work so that we may get full work from them.

I am also informed that even the pay scales recommended by the Second Pay Commission for this department which, though given to the administrative staff, have not been granted to the scientists—I mean the revised scales. It may be that Government may be thinking of some-

thing better than what has been recommended by the Pay Commission, but I think a decision should be taken as early as possible so as to allay fear in the minds of the scientists.

Again, this department is a temporary department. I know the word 'temporary' has no meaning in connection with this department because the work is increasing and probably in course of time, it will become a permanent department. But the treatment given to the employees should not be such as to make them feel that they are suffering from all the disadvantages of a temporary department, promising to be a permanent department, and they are not given opportunities to which, because of their knowledge and experience, they may be entitled in other sister departments.

With these observations, I hope that these matters will be looked into.

**Shri Joachim Alva (Kanara):** At the outset, I should like to pay a tribute to the hon. the Prime Minister and Dr. Bhabha, our scientist, for the work that they have put in this particular department. The Department of Atomic Energy and our scientific achievements, in a way, constitute the baby of our national achievements. It is the youngest in age, but has grown into a healthy baby. To have built up so many scientific laboratories and scientific institutions—the few that are in and around Bombay are of the highest quality—is something to be proud of in South East Asia, and we can hold up our head with dignity—and also in humility—around South East Asia or even the west of Asia.

It is hard work. The work has started from scratch and it has grown into stature. We cannot produce scientists overnight. Scientists—boys or girls—cannot be produced in that way. In the Soviet Union, there are so many women scientists of the first rank. When we have so many young ladies who are married and who have post-graduate studies to

their credit, it would be worthwhile to tap their talent and put them to work in this important national activity.

I heard a very interesting lecture in the United States last year by Dr. Teller, one of the makers of the hydrogen bomb. Young though he was, his words have been imprinted in my memory. He said, 'Unless we revolutionise our scientific studies, our basis of society will be changed'. When he said that 'the basis of society would be changed, he meant the society perhaps which would go to the left. He made a very impartial survey that day, and then talked of the radio talks or science meant for the United States. He said it was not worth while having radio talks early in the morning for children or adults which nobody heard, while countries like the USSR had good and better radio talks which were heard by others, and he recommended that the United States scientific radio talks, their entire programme, be revolutionised in such a way that they be heard during the day, heard by children and adults.

We are just growing in this line. We want our boys and girls to be scientists. You cannot produce scientists overnight or in the market place. A country is judged, the progress of a country is judged, by the scientists and engineers it has. Tell me the number of engineers and scientists in your country, and I shall tell you where your country stands. That should be the common, modern standard. Hence, these scientific institutions that we are having are something to be proud of, and we shall not stint in energy, in money, to make them better and better and diversified, and to put them in every corner of the land, east and west, north and south.

The Tata Institute of Fundamental Research has done excellent work. It proudly claims that it has a cosmic rays group which produces balloons

which are 70' in radius, capable of carrying loads of 80 kg. and more, and going to 110,000 or 120,000 feet. These balloons have been used in very important cosmic ray studies, and our record in that field of work is very good. This cosmic rays group is one of the largest and most diversified in the world, and that is again another distinction.

Then, the work that they have done in geophysics also is very interesting. The Institute has the distinction of the members of its staff having participated in the discovery of five out of 12 known cosmic ray-produced isotopes used in geophysical investigations.

Thus, the preliminary ground has been covered by the Tata Institute of Fundamental Research in Bombay which has done pioneer work both in physics and mathematics, that it has almost stolen a march over the Indian Institute of Science, which has been carrying on in Mangalore in a quiet and unobtrusive way, founded by a distinguished pioneer many years ago.

Last year, when the Canadian-Indian reactor was inaugurated by the hon. Prime Minister, they had a very interesting symposium on nuclear power, and they invited delegates from the leading countries. They had discussions in a frank manner, and it is heartening to know what the United States delegate said. He said, to quote his exact words, "We have been much impressed with the intelligence and technical capability of the men and women in your programme." Here was a tribute paid to the men and women who have been running our scientific institutions, and this was paid by the Commissioner of the United States Atomic Energy Commission, Dr. Robert E. Wilson.

Now we have progressed a little further in the sense that this week or last week the United States invited our scientists to study meteorological observations. That is again very im-

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portant. The work of our Atomic Commission important in one particular field, especially in the level of strontium 90 and caesium 137 which showed a decreasing trend last year. The decrease is due to the smaller deposition of radio-activity from the stratosphere on grass and vegetation. This may be a small thing from the point of view of the layman, but is very important from our national point of view, because milk is our top-ranking product. We are neglecting the milk problem. In this, the land of Hindustan, with a majority of Hindus, the cow has been completely neglected. Wherever you may go, if you ask for a cup of pure milk, you never get it. That we have concentrated on this aspect is also a distinctive contribution to our national welfare.

The annual report is also a very interesting document. We have a comprehensive programme for achieving self-sufficiency in electronic and other instruments needed by Trombay as well as the country as a whole. We saw the exhibition of nuclear and atomic energy held in Delhi. We saw the number of delicate instruments they had manufactured. If we are able to have self-sufficiency in electronic equipment for the country as a whole by producing those instruments for Trombay as well as for the entire whole country, then we would have done a great job not only in saving valuable foreign exchange but in training a large number of our technicians.

In the concluding paragraph of the report, there are a few interesting lines about the peaceful uses of outer space and its increasing importance to the future. We have accomplished a good job in the peaceful uses of atomic energy. We had our scientists, Dr. Bhaba presided over the World Conference on the peaceful uses of Atomic Energy. Now is the time when people will have to venture out more. The Russians have done it; they have shown the way of going seventeen rounds within 5 hours; that is a very terrific achievement by which every-

one has been thrilled. We shall have to harness our scientists to the outer space research, sooner or later. The Americans have invited us to go over there in connection with the meteorological studies. We may have also to utilise any such opportunity that the Russians may give us in the matter of acquiring knowledge about outer space.

There are one or two more points before I sit down. Rs. 75 crores have been demanded in the Third Plan for the Atomic Energy Commission for research and other work. This is not a very large sum. People may think that we are wasting some money here and there. If we consider the output and achievements that have been done in the last few years, they are something to be gratified with. Whatever be the achievements of our public sector projects, I humbly suggest that in these projects there should be a group of cost accountants so that in a minute's notice they may be able to give any kind of figures and statistics which anybody wants. Our public sector is suffering for want of first-rate cost accountants. We have enormous factories in the public sector and they have really suffered. We should have competent people so that they may give the correct figures when we get the returns. We have got about half a dozen factories in the public sector which are the pride of our country and of our industrial progress.

We claim, rightly, that we are blessed with the largest and the richest deposits of thorium in the whole world. That is inherent positive wealth for us from our Mother earth. I would request that research should be done in the east coast and not merely on the ends of the west coast where thorium is found. We may find more quantities of this precious metal on the eastern coast also. Our scientists and investigators will have to make search all along our coasts. We have a very large coast on the east and the west. Fortunately there

is so much of this material underneath. We also find gold's worth in the human material; the fishermen boys who inhabit the coast are first class material but these boys have never been given a chance either in the Government or in the schools or colleges. This human talent is crying to be utilised. There is this rich material in the shape of this metal under their foot. We shall not forget to tap this human talent. There are plenty of young men and women on our sea coasts and most of these fishermen boys and girls have not even had the advantage of primary school education.

There are one or two more points before I sit down. We have the Travancore Minerals Ltd., in Travancore. It is doing valuable work. I have not been satisfied that that company is doing a full job. This company is producing ilmenite and in addition it will produce titanium dioxide which will be very useful for plastics, paints, ceramics, etc. It produces enough material to satisfy local as well as foreign demands. If we are to have the maximum production of this material out of this company, and if this company is to put out its products in the foreign markets so that we can drive some foreign exchange for our national income and national development, then, it is time for us to see that the Atomic Energy Commission comes before Parliament and ask that the Government may subscribe enough shares to have control of this company.

I shall now conclude, as the discussion is perhaps to end at 6 O'clock, and other hon. Members are to speak, before the Prime Minister replies, I conclude.

**Shri Harish Chandra Mathur (Pali):** Mr. Deputy-Speaker, Sir, I stand with a pardonable sense of pride when I talk of this subject and the work of this organisation. Naturally our feelings of deep gratitude and appreciation to the Chairman and his team of scientists go out for their marvellous

work which they have done in a brief span of time, when we consider the difficult nature of the work and the technological skill that it requires. It was just in 1954 when I think the first atomic energy power house of the size of about 1,500 megawatts—possibly a pilot project—was set up in the U.S.S.R. I happened to be there at that time and we were thrilled to know that that power station was going to be switched on. At that time, we could never have imagined that so soon this country would be able to make such a terrific advance as to plan today for a power house of a magnitude which we have got sanctioned for the Third Plan. I have paid more than two visits to our reactor in Bombay, and when one goes there, one feels absolutely fascinated and thrilled to find that during this brief period, we have got together a large number of our local scientists working with devotion and enthusiasm. If I felt called upon to speak on this subject, it is because that I was a little pained to find that the Chairman of the Commission has off and on felt compelled to defend the development of atomic energy in this country. It is really unfortunate. As a matter of fact, his mind and the mind of his team should be completely freed from this idea, that there are certain people who criticise the development of atomic energy, and that he has to be apologetic and be on his defence for this particular purpose.

I can quite appreciate the public criticism and I do not consider it to be a propaganda when the facts and figures are given out to say that the generation of steam power is much cheaper than that of atomic energy. There are three factors which have been given out in this connection. The first is the capital cost of thermal stations. The second is the cost of generation. It has been stressed that the capital cost is too high, and so also the cost of generation does not compare favourably with the ordinary

[Shri Harish Chandra Mathur]

steam power generation. I will not go into all the details. My work has been very much lightened by a very excellent speech made by my hon. friend Shri Naushir Bharucha who has given all the details. Let us candidly and clearly understand that at the present moment, it is quite clear that the generation of thermal power is cheap and that its cost of generation is also cheaper. But as he rightly pointed out, in both respects, so far as nuclear power is concerned, both the cost and the cost of generation is going down very considerably with the passage of time. But much more than that, apart from the very significant point that has been made, it has never been the claim of the Atomic Energy Commission that it would be an economical proposition if you just put up a power station just near the coal fields. They have always very clearly stated that at longer distances, where coal has got to be transported for about a thousand miles, say, near about Bombay, Madras or Rajasthan, power generated by atomic power station would be cheaper. We have got all the facts before us which clearly bear out this proposition.

I would like in this connection to stress another point, which I think is of considerable importance. Apart from the fact that power at these distances will be cheaper, let us understand our problem in the third Five Year Plan. Even at the end of the second Plan, we felt that there was almost a crisis of transport. Regarding transport of iron and steel, cement, coal, etc., our transport development could not keep pace with the other industrial and agricultural development and we will require considerably much more funds during the third Plan.

We have made it abundantly clear on the floor of this House that our transport is lagging behind and will not be able to cater to the demands of industrial expansion and agricul-

tural development. If this crisis is to be resolved, generation through nuclear energy comes in almost as a boon to us. This transport crisis is affecting us in another way. We are now wanting to transport coal. Even the railways which are transporting coal have always made out a case that the competition between road transport and railways is not fair, because the railways are transporting coal at a subsidised rate. Though it is not below the cost price, it is almost at a subsidised rate. That is why we have felt compelled to bring about certain co-ordination and damp the development of road transport simply because of transport of coal by railways. Even then we have not been able to solve the problem and we have felt compelled to resort to transport of coal by coastal routes, which is costlier than transport through the railways. So, we have levied a cess, so that the cost of production and the cost of coal everywhere goes up. It is very fair that a cess has been levied but what is the result of levying this cess? It adds to the cost of production every field. It is very vital that the cost of production must be brought down if we are to make a success of our third Plan.

If we are to improve our exports, we must see that the cost of production goes down very much. If the cost of production is to go down very much, we have got to pay special attention to this matter. Therefore, even on these absolutely material considerations of commerce and economy, I submit that the development of nuclear power is a must for this country. It must be made absolutely clearly to those people who are working for us heart and soul—their mind should be kept completely free—that they should go ahead and that should not bother about the criticism that is made. It is for the Parliament and for the Prime Minister to meet that criticism. We know the facts. It is always good to have that criticism and to have the facts from them.

But they must be given massive support in this matter both from the Parliament and from the Minister in charge.

I feel, Mr. Deputy-Speaker, that this Atomic Energy Commission would never have made this progress had this department not been under the direct control of the Prime Minister. But for his personal interest and the massive support which he has been giving to this department, it would never have been possible for it to make this progress; it would have collapsed under criticism from the various quarters and it would have been very difficult for any Minister to have defended it.

Now, in this age of science and technology, I cannot even conceive how we can think of not giving the most appropriate encouragement to the development of this particular section of science and technology. How can we do without it? In this advancing age of science and technology I think our fullest support must go to it. We cannot count rupees, annas, pies in such matters. Development has got to take place. We do not know what is in store for us in the future. Every day we are making researches and so many discoveries, and we do not know what are the potentialities. Can we wait till all the parts of all the other countries have made technological advancement and after they come to the conclusion that atomic energy is really useful we can make a beginning after ten years? That is not at all a practical proposition. The country must understand the whole development in the proper perspective, that it is a necessity not only from the commercial point of view but also from the view point that we are in an age of technology.

A word was said, Mr. Deputy-Speaker, about the terms and conditions of the service of the scientists. I wish to avail of this opportunity to stress a point which I have been hammering

whenever I have been able to get an opportunity. I feel that it is not at all a question when we should be tinkering with this problem. Let us go to the root of the problem. What is the root of the problem? Whether it is a Communist country or a democratic country, is it not a fact that the scientists and the engineers get a much better salary than the administrators? No progressive country can afford to do anything other than this that they must pay a much better salary to their scientists and to their engineers and teachers.

Sir, I have made a little study of this subject. It is not necessary for me here to give the pay structure obtaining in the various countries. But the basic question is whether we want to attract the first-class men to science and technology or we want to attract the first-class men to administration. I do not for a moment suggest that administration as such has no importance. The administrators have their importance. But if in a progressive country, in the matter of advance and development we come to this conclusion that we want to attract first-class men to science and technology, then we must concede that the terms and conditions of service of the scientists and engineers must be better than those of the administrators. If you do not do that, whatever rise in salaries you might give, if their salaries are a shade lower than the salaries of the administrators, definitely we are not recognising the fundamental thing and the natural result of that would be, even if the salary of the engineers is raised to Rs. 3000 and the salary of the administrator remains at Rs. 4000, the position will remain the same, that all first-class men will be attracted that side and only second class men will be attracted to science and technology. It is not as if the pull of research and the desire for scientific knowledge will not attract a large number of people to that field. There will be many people who will be

attracted to that study. That is correct. But it becomes necessarily the duty of the Government to discharge their responsibility in this matter by making conditions which are obtaining in almost every developing country which has not got the vestige of colonialism, where law and order and the collection of revenue are the prime considerations, a country which is progressive and developing should create the right sort of atmosphere for this purpose.

**Mr. Deputy-Speaker:** Is that all?

**Shri Harish Chandra Mathur:** I will finish in a minute.

It is very good to have a number of good scientists working in Trombay and the other centres to be established. But I think it is very necessary that there is general education in the country, starting right from the secondary education. The boys that go there must be completely re-oriented, and the re-orientation must be to give them a scientific approach, a scientific bias so that students from the very beginning have certain inclinations and they start thinking of it. We must have simple articles and simple literature made available to our people, telling them what science and technology mean and what their achievements are. We should do such an amount of work there at that level that our young men and boys feel attracted to that and they develop a different mental outlook from what they are developing today so that they may not feel drawn by a clerical job here or there. The Atomic Energy Commission owes it to the country and to the people to make such simple literature available to the people.

As I said at the outset, I do not mind any criticism. But there should be better understanding at least between two Government departments. The Atomic Energy Commission and the Central Water and Power Commission are colleagues, as a matter of fact, and they are working in a particular branch. So, they must understand each other better. As they are departments of the same Government,

they must work in harmony, one supplementing the other, instead of creating controversies. Something must be done to bring them together and to create understanding between the two.

**Mr. Deputy-Speaker:** The hon. Prime Minister.

**Shri Kodyian** (Quilon-Reserved-Sch. Castes): I want only two minutes.

**Mr. Deputy-Speaker:** I am sorry. I have already called the Prime Minister.

**The Prime Minister and Minister of External Affairs** (Shri Jawaharlal Nehru): Mr. Deputy-Speaker, Sir, I feel somewhat embarrassed in speaking on this subject and on this occasion. Normally, members of this House speaking on behalf of the Government have to meet criticisms, sometimes strong criticisms, of the policy adopted. But here I have been sitting and listening, not to the criticisms but to the bouquets being showered upon the Atomic Energy Department. My name is sometimes included in it, as the last speaker did. But every member of the House knows that I am very much a lay man except for a feeling that science is important, science is a governing feature in the march of the world and Atomic Energy Commission is a department of the Government which has to play an important part and, therefore, it should be encouraged; that is the only part I play. Therefore, I can, with due modesty, accept these bouquets, because they are meant for others really, who have been working. I would like to join in them.

One thing which was just referred to is even more basic, if I may say so. The basic question is the importance of science and scientific outlook. You may call it the modern outlook, if you like, because the world today does depend so much on science and technology that without understanding them you do not understand the modern world. So I entirely agree



that from the earlier stages, not merely from the secondary school stage but to some extent from the primary school stage, an element of scientific practice, laboratory work or whatever it is, should come in so as to affect the thinking of the boy or the girl. As he or she grows up naturally more and more of this should come in. I have no doubt about it because as I look at the problem of India today there are so many aspects. The Third Plan runs into 770 and odd pages and deals with just the broad skeleton of the so many aspects. Yet, the basic aspect is to pull out India—by India I mean not the hon. Members sitting here but the hundreds of millions of people working in the fields etc.—out of the ruts of old practice and thinking—it is no fault of theirs; of course, no opportunity has been given to them—and make them think on modern lines; make the farmer function with new implements, with new ploughs etc. and thereby functioning through them think in new terms. That is a general observation with which I, therefore, entirely agree.

We might say that one way of looking at the history of the world is to consider the sources of power that have been available to humanity from time to time. Another thing is the tools human beings have used. They are the tests of the growth of the world and they are connected really. The principal source of power in India—I do not know—was cowdung. It was a source of power which cost so little and yet people have calculated that more power is derived from the use of cowdung than by your big schemes. That itself indicates the low stage of our economic or industrial growth. Power is a symbol of growth, as also tools. We have had steam power. We have had electric power. Now we arrive at the stage of atomic power in its various phases. It is of the highest importance that a country or a community understands the new power, whatever

it may be, and indeed tries to go beyond it. Therefore purely from the point of view of keeping pace with the modern world—not only keeping pace with it but trying to be in the front of it—it is of the highest importance that we should understand and develop atomic energy in this country.

There has been some reference here to criticism. That criticism, I can only say, must be based on a basic misunderstanding of the position and of this new world opening out with new types of power and all that which leads to space travel etc. Let us take industrial development. People imagine that industrial development is getting a machine, putting it there and getting a person trained to work the machine. That is, of course, one aspect of it. But the essential aspect is not that. The essential aspect is getting the mind of the person there tuned to the machine age. Anybody can work a machine in a routine way, a simple machine. But it does make a difference if his mind is tuned to it. Then he works in a different way, he makes progress and he makes new machines and all that. And so also those people, not many but some, who criticise, who seem to think that atomic energy is not so important as all that, do so, I think, because they have failed to understand what the modern world is, where we are going to, how we are going to reach there; and so they pick out some odd things and criticise them.

So the first proposition I would like to remind the House about—it is not really necessary, because other Members have said so too—is the vital importance of our developing that complex of things which is called nuclear energy, atomic energy, call it what you like. But it is a complex thing, it is not a simple thing, it is a highly complicated thing based, as most sciences of a high order are, on mathematics of an extraordinarily

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complicated kind. We have to develop that. That is quite essential.

In developing it, it is not a question of theory, reading books; it is a business of doing the thing and learning from it. The whole world is learning from practice, not merely from books, although books are written and read. Therefore, we have to do it.

We have succeeded in this matter to the extent we have, and that is very creditable. Because, we have been doing the job, not merely reading about it, not merely getting somebody, whether he is an American or a German or a Frenchman or a Russian or a Britisher, to do it for us, and we just copy it. That is not good enough. We have done the job ourselves, having learnt it no doubt. Even now there are hundreds of our young atomic scientists spread out in other countries, learning the latest types of work and coming back and doing it.

So the first thing is this great importance, first of all of science generally and secondly, as we are dealing with it, of nuclear science, the practical side. I say so because some people, even in our universities, imagine certain things, and they want to have a Chair in Nuclear Science, Nuclear Physics. Very good; I should like all our universities to have it. But they have not the wherewithal. They may have a bright person to train in nuclear science. They probably have not got the equipment, proper equipment for it. They might have got some simple things. The result is that they cannot do much work, effective work.

This high type of work requires team work, requires a number of the highest type of trained persons, and that is team work. If Trombay is succeeding, it is because we have a very large collection of people, young scientists, who are doing team work. There are about two to three thousand and there—I forget the number—and

everywhere. Not that we are going to have an atomic bomb or a hydrogen bomb. But if the atomic bomb or the hydrogen bomb came into existence, it was due to hundreds and thousands of scientists being put together, almost in a detention camp, in the United States of the time, and made to work night and day over it together. It was due to team work. Naturally, a team has to have a leader, has to have bright heads. And the brightest head in the world today cannot achieve these things unless they have a large team. So we have to do that.

A few persons talk about the actual direct atomic work which is being carried on in various fields, at Trombay or elsewhere. But some criticism is raised chiefly in regard to the atomic power stations. It has been dealt with already by hon. Members who have spoken, specially by Shri Naushir Bharucha, and I do not want to repeat it. But I would just like to point out again that there are two aspects of it, possibly more than two, but at least two about the atomic power station.

One important aspect is not economic. We have got to do it, to know how to do it, to be able to do it. When we want to do it in a big way, we must have that practice. We must have that know-how; we must train our people to do it. There are bright people who can easily be trained. In fact we have trained enough men to begin doing it. It is highly important that we must do that so as not to let the future slip from us. We must prepare for the future today. To what extent we should do it, now or later, depends on other factors. Let us say, it is not an economic proposition at all today. I say, even so, we have to do it for tomorrow or the day after.

If it is a proposition of starting a number of power stations suddenly or more or less at the same time, then, we have to consider other factors, the costs involved, the economics of it, how does it compare with other

forms of producing power and so on. The first point is, it must be remembered that it has to be done whatever the cost. You may do it in a small way because we cannot allow this moment to slip from our hands, because it takes four or five years. If we have a power station at Tarapur, with the best will in the world, it will take five years to function properly. If we have another, it will take another four or five years. Unless we get going now, we miss the chance and we cannot catch up again.

Then, we come to the economics of it. There are various arguments and various approaches. Shri Naushir Bharucha dealt with some of these matters. There too, there are two or three considerations. One is the present position: what the economics are today. The second is the position in a particular country. For instance, the position in the United States may be quite different from that in China or India. The United States has got cheap power. The economics of power in the United States may be quite different from the economics of power in India as it is. Again, the economics of power in the Jharia area are different from the Rajasthan area where they have to pay for coal transport, or the Bombay area. All these aspects come together. In circumstances where coal is easily available, naturally that would give an advantage to steam or thermal power. In areas where coal is far off, the advantage may shift to production of atomic power. Thirdly, as was also pointed out, the tendency is for atomic installations to become cheaper. It is a normal tendency and probably in the course of years, it will be much cheaper. Fourthly, I would say, quite apart from the question of conflict between conventional ways of producing power and atomic ways, we, in India, lack power so much that every way has to be employed to get it. According to some people,—I do not know how far it is true—in the future,—not too dim

and distant future—we may run short of our conventional ways of producing power or not have enough of it and, therefore, we have to prepare for that time too. All these reasons lead us to the conclusion that we should begin in a fair way, not in an exaggerated way, with power stations.

I do not wish to burden the House with figures of how much coal transport costs if you take coal to Bombay or what difference it makes, and the fact that it is going by sea at a more or less subsidised rate. All that has to be kept in mind if you compare two things. Even at present it is cheaper. For all the figures I have, it is cheaper to have atomic power stations in some parts of India, and it may be still more cheap later. This criticism raised against atomic power stations seems to be based on complete misunderstanding or whatever it may be. It does not fit in with the facts of the case, with the circumstances of the situation in India, for today and for the future. And we cannot do as we did in the past. There is one thing that we cannot afford to do today in India, and that is not to prepare for the future. We became a backward nation; other countries went ahead with steam, electric power and all that, and we stuck on to some old methods of thinking and action in agriculture and industry and everything; we became backward in the past. We cannot afford that now. We have not only to catch up but to catch hold of the future and prepare for it.

There were a number of other matters that were mentioned. Some hon. Members, I think, Shri D. C. Sharma, suggested that we should try to produce a white paper on this subject of costs. Well we shall give thought to it and we shall try to do so.

There was some reference, I think, to electronic equipment. Electronic equipment is being produced at Trombay in variety and in quantity, and no doubt this will increase.

[Shri Jawaharlal Nehru]

At the present moment, the idea is to have a power station at Tarapur. That is decided. And we have arrived at a stage when tenders have been called, and they will be coming in presently. The next stage envisaged is an electric power station somewhere in this area, namely the UP-Rajasthan-Punjab-Delhi area, somewhere here, at whichever may be the right place, to supply all these areas. The first is definite. The second is more or less decided, not the details, but the broad idea has been accepted. The rest are still in the thinking stage. But, it is proposed to have a small station, I think, probably, in co-operation with Canada, a small one for some experimental or other purposes, and then, of course, any number in the minds of our people. And a Committee has been appointed, a high-powered committee, to select sites. The first work that they have to do is to select the site for this UP-Rajasthan-Punjab-Delhi area whichever is convenient. As far as I remember, the chairman of that committee is Mr. Hayath, and there are many other

people from the Atomic Energy Department in that. Those people will not only choose this, but provisionally at least have some idea of the other places where this might be started; we want one for the south and one for other places too; but that is really for the future. So, we cannot think of them practically in the sense of doing much now or in the very near future.

It might interest the House if I tell them how generally our expenditure on scientific research and, especially, atomic energy has been proceeding. I am quoting from the fat volume *Third Five Year Plan*. At page 619 these are the figures that have been given. Two sets of figures have been given, the Second Plan figures and the Third Plan figures. The figures have been given for the Council of Scientific and Industrial Research and various things under the Ministry of Scientific Research and Cultural Affairs, various things meaning scientific institutions. The figures are as follows:

(Rs. crore)

	Second Plan estimated expenditure	Third Plan
Council of Scientific and Industrial Research	20.00	35.00
Department of Atomic Energy	27.00	35.00
(This does not include the power station or stations; that is separate)		
Agricultural Research	13.80	26.40
Medical Research	2.20	3.50
Research under other Central Ministries (other than Defence)	9.00	30.89

Defence figures are not given in this because the Plan does not go into Defence.

I have not got the figures here, but it is well known that defence science has made very great and very substantial progress and is going ahead at a fairly fast pace. So from the point of view of scientific progress, this is very welcome.

I have spoken about the Tarapore Station. I might mention that it is our intention to throw open Tarapore for the training of foreign scientists also,

approved by the Government of India naturally, specially from underdeveloped countries. In fact, in this big Canada-India Reactor, this was one of the understandings between Canada and us. Article 2 of the agreement between Canada and India reads:

"The Government of India will make the facilities of the Reactor available to scientists approved by the Government of India from other countries including Colombo Plan countries, in South and South-East Asia".

This is because we realise that it is our duty to afford these opportunities to other countries. Not many countries yet have these facilities. Some European countries have them and at present at least, there is hardly any Asian country which can afford the facilities that we offer them. Therefore, we think it an obligation to other countries to give them this training here.

There were some points raised, Shri D. C. Sharma said something to the effect that we are weak in metallurgy. That is not true about the Atomic Energy Department. Our making fuel elements is a sign that our metallurgy is good. There are only about half a dozen nations who can do this and we are among them.

Mention was also made about the use of atomic energy in medicine. Of course, it should be increased. This is being done on a fairly large and ever-increasing scale, and we are considering some proposals for a further increase in this.

I think Shri Joachim Alva said something about monozite deposits.

**Shri Narasimhan (Krishnagiri):** Deposits on the east coast.

**Shri Jawaharlal Nehru:** To be correct, it is east, not east coast. In fact, the biggest deposits are in Bihar, which may broadly be called east but is not the east coast. Anyhow, these Bihar deposits round about the Ranchi plateau are very considerable and are probably larger than the big deposits in the Kerala coast.

I think Shri Joachim Alva also said something about producing titanium dioxide from ilmenite. There is no difficulty about doing this, and some private parties are putting up some such plant. The demand for ilmenite for this in the Indian market is a very small fraction of what is required abroad.

The hon. Member opposite said something about pay scales. I am

told that pay scales in accordance with the Pay Commission's recommendations will be fixed fairly soon and given retrospective effect from the 1st July 1959, that is, from two years ago. In addition, there are special pay scales on which the Pay Commission made no recommendation, and it is on account of these that delay has taken place in fixing these other scales, but this fixation will be retrospective and our scientists will certainly be as well off as but probably much better than the others who are more or less on these scales.

18 hrs.

I should like to offer my gratitude to the House, to hon. Members, who have not only today but all along given so much attention and understanding sympathy to this work of the Atomic Energy Department, because of which we have been able to proceed with this confidence that the Lok Sabha and Parliament are behind them. And that is one major reason for the progress we have made.

**Shri Braj Raj Singh:** May I put a question? By what time will the location of the second plant in the Rajasthan-U.P.-Punjab-Delhi area be decided by the committee which is going into this?

**Shri Jawaharlal Nehru:** I really cannot say. A committee for selection of the site has been appointed. It will take some time. We cannot expect a quick answer.

**Mr. Deputy-Speaker:** I do not think Shri Sharma has to say anything now.

**Shri D. C. Sharma:** Two minutes, Sir.

There is only one problem which worries me when I think of the Atomic Energy Department, and it is this. Our Bhakra-Nangal dam has become a part of our national heritage, our Durgapur steel works

[Shri D. C. Sharma]

are a part of our national industrial wealth. Similarly, I want our reactors, the Canada-India reactor and others, to become a part of the thinking of the people not only in the Lok Sabha but also outside. It is a pity that they have not been so much thought of as they should be. Of course, if we have given bouquets to the Prime Minister and to the gentlemen who work in the Atomic Energy Commission it is because they deserve them. I thank all of them. All the persons connected with the Commission have been working in a spirit of dedication, and I am very happy that they are going to have their pay scales revised. That is very good, but in spite of that I think that the pay is not the only consideration with them but it is the

spirit in which they work, the spirit that they should advance India on the road to scientific achievement, and I wish each one of them well.

**Mr. Deputy-Speaker:** The question is:

"That this House takes note of the Report of the Department of Atomic Energy for 1960-61, laid on the Table of the House on the 7th August, 1961."

*The motion was adopted.*

**18.03 hrs.**

*The Lok Sabha then adjourned till Eleven of the Clock on Monday August 21, 1961 Sravana 30, 1883 (Saka).*

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