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SIXTH WORLD POWER CONFERENCE
SIXIEME CONFERENCE MONDIALE DE L'ENERGIE

MELBOURNE 20-27 October 1962

VOLUME 1

TRANSACTIONS — *COMPTE RENDU*



AUSTRALIAN NATIONAL COMMITTEE
1 COLLINS PLACE, MELBOURNE, AUSTRALIA



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As decided at the 1962 meeting of the International Executive Council of the World Power Conference, these Transactions are presented grouping all technical papers and general reports in Volumes 1-10; the discussion which took place at the technical sessions and the texts of the General Addresses are in Volumes 11 and 12. Volume 13 contains a chronicle of the meeting and Volume 14 the index.

Ainsi qu'il l'a été décidé en 1962 au cours de la réunion du Conseil Exécutif International de la Conférence Mondiale de l'Energie, le Compte rendu des rapports techniques et des rapports généraux est présenté dans les volumes 1 à 10. Les textes des discussions qui ont eu lieu au cours des séances techniques et les textes des Conférences générales sont imprimés dans les volumes 11 et 12. Le volume 13 contient une chronique de la session et le volume 14 l'index.

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- I.2 Energy Resources — National Surveys.
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NOTE

The main item dealt with in this Sub-Division was the **World Power Conference Survey of Energy Resources 1962**, which has been published as a separate document by the Central Office. However, in addition to this Survey, two technical papers were presented and were the subject of a separate General Report.

*La principale question traitée dans cette Sous-section a été le **Recensement des ressources énergétiques de la Conférence Mondiale de l'Energie de 1962** qui a été publié séparément par la Bureau central. Cependant, en plus de ce Recensement, deux rapports techniques ont été présentés et ont formé le sujet d'un Rapport général séparé.*

SUB-DIVISION

I.1

SOUS-SECTION

SESSIONAL OFFICERS—COMPOSITION DU BUREAU

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Australia**

**Associate General
Reporter**

E. G. WARRELL

*Rapporteur général
associé*

**Chief Engineer, Investigations
Snowy Mountains Hydro-electric Authority
Australia**

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DIVISION I

SUB-DIVISION I.1

GENERAL REPORT

ENERGY RESOURCES WORLD POWER CONFERENCE SURVEY OF ENERGY RESOURCES

General Reporter

H. G. RAGGATT, C.B.E., D.Sc., F.A.A.,
*Secretary, Department of National Development;
Deputy Chairman, Australian Atomic Energy Commission;
Chairman, Snowy Mountains Council.*

Associate General Reporter

E. G. WARRELL, M.C.E., M.I.E. Aust.,
*Chief Engineer, Investigations,
Snowy Mountains Hydro-electric Authority.*

This General Report relates to two papers which have been included under Sub-Division I.1 of the Technical Programme.

Paper No. 185 is an information paper, the main purpose of which (as mentioned by the author) is to discuss for the benefit of those not directly concerned with the oil industry or with petroleum exploration, the factors which have led to its growth and will control its future development. The summary appended to the paper presents a concise review of its contents and it is not intended to provide a further detailed review in this report other than to state that the paper defines, with appropriate examples, the significance of the term "reserves" as used in petroleum exploration and describes the geological environment of oil and methods used in exploration and discovery.

Of particular interest to those intimately associated with the oil industry is the assertion that "we now accept the view that oil and gas are formed from organic matter deposited in the marine environment in the basins of the Continental Shelf"

This raises an interesting point for discussion since, although statistics of successful discoveries support this view, they can be misleading because other environments have not been tested to anything like the same extent; significant discoveries have been made in the deep basin environment.

With regard to Paper No. 21 by Salmon and Serra (France) a summary and comments are given in the following paragraphs.

The paper deals with the methods of assessing world hydro-electric power resources. It points out that, while other sources of power must be regarded in the long term view as exhaustible, hydro-electric energy is constantly renewed by the hydrological cycle. In the long term, therefore, it appears likely that full development of hydro resources will be required, if only to conserve supplies of other fuels.

However, hydro resources are not unlimited and there is no way of adding to them. Hence it becomes a problem of assessing what is available and fitting this in so that best possible use will be made of it, not only within the country immediately concerned but, with current thinking overcoming political differences, on a regional or even wider basis. This emphasizes the need for standardizing methods of assessing hydro-electric potential. Three hydro potentials are described; theoretical, technical and economic. It is suggested in the paper that theoretical potential gives the best basis for comparison with the least scope for uncertain or unacceptable assumptions. The paper therefore deals only with theoretical potential and sets out graphical representations of the calculations involved in its assessment.

The basis of the estimating method is an altitude-discharge diagram which provides for an integration of height-discharge over the extent of the catchment under consideration.

The two basic sets of data required are heights and stream flows throughout the area concerned. Reference is made to a quick and simple method of obtaining heights when these are not readily available from existing survey plans. Collection of discharge data is not so simple, however. Lack of hydrologic data, particularly in sparsely populated or underdeveloped regions remains a major problem. While accuracy can be improved by the use of a greater number of gauges or by extending the period of record, it is necessary to ensure that expenditure on hydrologic studies is justified by obtaining optimum results with both permanent and temporary gauging stations.

It is suggested from consideration of the altitude-discharge diagram that assessment of the output available from the whole of the catchment can be obtained reasonably accurately if stations are concentrated on the main streams rather than scattered throughout the whole of the area.

The paper goes on to give formulae for gross and net theoretical potential which, it is suggested, could be adopted to ensure uniformity in reporting between countries.

A further formula to approximate available net theoretical output for an average year is also suggested. The method of derivation of this formula, which assumes approximately 60% of the water being utilized, appears of somewhat doubtful validity. It would seem preferable for assessment and comparison purposes to disregard aspects such as capacity factors, operating hours or stream flow regulation which can be unique to particular countries, electrical systems or rivers.

The use of maps to present isopleths of theoretical output is also described. It is also suggested that the estimated theoretical output or available energy might be refined by applying an index designed to take account of stream flow variability. The proposed application of such an index appears to warrant further study before adoption for world-wide surveys.

The paper includes an assessment of the theoretical hydro-electric potential of the continents of the world. The figure for Australia warrants comment. With average elevation of less than 300 metres and extremely limited water resources, the theoretical potential of the mainland with an area of 7.6 million square kilometres would be less than 20 million kilowatts. It is difficult to reconcile this figure with that stated in the paper.

The paper concludes on the note that it is unlikely that the hydro-electric resources of the world will be fully developed for at least another century. However, what is not stated is that from the figures provided in the paper it is apparent that over one-half of the theoretical potential of the world is in Asia and Africa. It appears to be in the Asian and African areas that the possibilities for future large scale hydro development exists and wherein the future of the hydro-electric engineer lies.

Points Suggested for Discussion

1. The validity of the assertion in Paper No. 185 that "... we now accept the view that oil and gas are formed from organic matter deposited in the marine environment in the basins of the Continental Shelf".
2. The extent to which it is necessary to standardise on formulae of the type suggested in Paper No. 21 and what difficulties, if any, have been experienced from a lack of such standardisation.
3. The appropriateness of the formulae suggested in Paper No. 21 for gross and net hydro potential and net theoretical output.



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SECTION I

SOUS-SECTION I.1

RAPPORT GENERAL

RESSOURCES ENERGETIQUES RECENSEMENT DES RESSOURCES ENERGETIQUES DE LA CONFERENCE MONDIALE DE L'ENERGIE

Rapporteur général

H. G. RAGGATT, C.B.E., D.Sc., F.A.A.,
Secretary, Department of National Development;
Deputy Chairman, Australian Atomic Energy Commission;
Chairman, Snowy Mountains Council.

Rapporteur général associé

E. G. WARRELL, M.C.E., M.I.E. Aust.,
Chief Engineer, Investigations,
Snowy Mountains Hydro-electric Authority.

Ce Rapport général traite de deux rapports qui ont été présentés au sujet de la Sous-section I.1 du Programme Technique.

Le Rapport no. 185 est un rapport à titre d'information (comme l'indique l'auteur) dans le but principal de discuter des facteurs qui ont mené à la croissance de l'industrie pétrolière et qui influenceront sur son développement futur, afin d'aider ceux qui ne s'occupent directement ni de l'industrie ni de l'exploration du pétrole. Le résumé joint au rapport donne un aperçu succinct de son contenu et on n'a pas l'intention de fournir ici une description détaillée additionnelle, à part le fait de constater que le rapport explique, à l'aide d'exemples appropriés, la signification du terme "réserves" dans le domaine de l'exploration du pétrole et décrit les conditions géologiques où se trouve le pétrole et les méthodes de son exploration et de sa découverte.

Pour ceux qui s'occupent étroitement de l'industrie pétrolière, un intérêt tout à fait particulier est présenté par l'affirmation de l'auteur du Rapport no. 185, que "nous acceptons actuellement l'hypothèse que le pétrole et le gaz sont les produits de matières organiques déposées dans un milieu marin des bassins du plateau continental".