Position as Full Professor in Energy, Natural Resources and Environmental Economics, NHH

Report from the evaluation committee

NHH has announced a position as full professor in energy, natural resources and environmental economics.

NHH's hiring committee appointed the following committee to evaluate the applicants for the position:

- Professor Claire Armstrong, University of Tromsø
- Professor Olli Tahvonen, University of Helsinki
- Professor Ole Gjølberg, The Norwegian University of Life Sciences

Gjølberg was asked to act as co-ordinator for the committee.

Five persons applied for the position. These are

- Godal, Odd
- Gribkovskaia, Irina
- Haugland, Dag
- Steinshamn, Stein Ivar
- Wall, Göran

The committee hereby presents its evaluation report, organized as follows. First, we outline the assessment criteria that we apply in the evaluation. Next, we evaluate each applicant up against these criteria. Finally, we draw our conclusions.

Assessment criteria

The formal basis for this evaluation is *Rundskriv F-14-95* from the Ministry of Education and Research, stating that in order to be found qualified at the professorial level

applicants must document scientific production at an international and/or national level within the specified discipline. Our interpretation – and one that is common in such evaluations – is that in order to be found qualified for a full professorship, applicants must document a *significant* scientific contribution over and above the doctoral level. Thus, while a doctorate (or equivalent) is the *minimum* requirement for permanent employment in combined teaching/research positions at Norwegian universities or polytechnics, the requirement to be found qualified at the professorial level is considerably above this.

Documentation of a significant scientific contribution above the doctoral level is normally in the form of a number of articles published in the specified field in acknowledged scientific journals with peer review and in books published by recognized scientific publishers with carefully selected editors and reviewers. In addition, one would expect such work to have been presented at national or international conferences, and to have received some form of recognition in the research community, e.g. through citations in the works of other researchers. The research should exhibit clear elements of theoretical, methodological or empirical originality, and should also demonstrate a broad perspective. It has also become part of accepted practice to take account of the time aspect in scientific production, in which applicants must document that they have been researching actively in the period prior to their application, and in which less emphasis is placed upon older work. Beyond this, credit is given to applicants who can document other relevant activities such as extension services, the ability to take his/her research to an audience outside academia (the media, governmental organizations, companies, the business society etc.) Furthermore, documented pedagogic activities in terms of lecturing, supervising masters and PhD-students as well as production of pedagogic material such as text books, lecturing notes, software etc adds to the overall evaluation of an applicant for a professorship. However, it should be stressed that such factors cannot make up for a lack of quality, breadth or depth in an applicant's scientific production.

What, then, constitutes a sufficient body of scientific publications in order to qualify? During recent years, evaluation committees within economics/business typically have held some 6-8 publications (not counting works that have been part of the applicant's

PhD dissertation) in established and well recognized journals or/and book publishers as a requirement for professorships assuming sole authorship. The publications should span a certain range of topics within the field. Thus, in the case that articles are very similar or close to variations over the same theme and topic, the required number is increased. With one or more co-authors, the required number of articles is also increased[1]. In addition, the level of the journal is taken into consideration. Obviously, a publication in an A-rated journal normally will count significantly more than one in a B- or C-journal. There is a well established journal database set up by the Norwegian University Council, listing some 18,000 journals across all disciplines at two levels (Level 2: the top journals, representing approximately 20 per cent of the publication universe; Level 1: All other scientific journals, see http://dbh.nsd.uib.no/kanaler/). Evaluations for positions at Norwegian universities and colleges naturally will take into consideration the number of publications that have appeared in journals that the scientific community within a specific discipline would consider A-level journals. It should then be noted that a number of journals may be considered A-level without being listed at Level 2. This is due to the fact that Level 2 journals typically are those generic journals that are top ranked within a broad scientific field. There are, obviously, more specialized journals within sub-disciplines that are top ranked without being listed at Level 2.

Beyond the question of how much and where an applicant has published, the applicant's competence is evaluated in relation to the specific requirements laid down for the position in question. In the announcement text for this position, it is stated that in order to qualify, the applicant (quote) *".....must have general competence in Management Science or Economics."*

Management science (MS) is generally defined as an interdisciplinary branch of applied mathematics, engineering and economics in order to improve an organization's ability to enact rational management decisions by arriving at optimal or near optimal solutions to complex business problems. The discipline is typically concerned with determining the maxima (of profit, assembly line performance, crop yield, bandwidth, etc) or minima (of

[1] Typically, the adjustment factor is 1/sqrt(N), where N is the number of authors

loss, risk, etc.) of some objective function. In short, MS helps businesses to achieve goals using various scientific methods typically based on mathematical models and statistical methods. MS is also known as operation research (OR) in the United States and Canada, or operational research in the United Kingdom. These three terms are often used interchangeably to describe the same field.

While scientific analysis within economics in general is related to optimization, MS is specifically related to *decision analysis*, in particular for business firms or other organizations that seek to maximize/minimize object functions under a set of constraints. MS has a normative approach. Like all branches of economics, research in MS may be pure theoretical and methodological. However, in relation to the announced position, we interpret the text that in order to qualify, a significant part of the applicant's work must be considered to be *applied,* and particularly so in relation to firms and organizations involved in decision making within energy, natural resources and environmental economics.

In the quote above, one notes that the requirement is competence in MS *or* Economics. While MS very often includes issues within economics (and not only business decision making), the distinction ("or") may open up a wider gate than that given by MS alone. However, the announcement specifically mentions the fields focused in NHH's masters program in energy, natural resources and the environment. Based on the syllabus description, this program spans a wide range of disciplines and subjects, all related to economics, social sciences, and business. Core subjects are social science research methods, econometrics and time series analysis, economic decision models and microeconomics and optimization. In addition, the program includes finance, design and operation of electricity markets, petroleum and natural gas economics, economics of climate change, international fisheries management, and land use.

The announcement stresses the interdisciplinary composition of the program. We interpret this as to say that in order to be found qualified the applicant must document scientific competence in more than one of the disciplines or fields specific to this masters program. This means that we interpret the announcement text such that competence in MS and economics must be related to the core subjects and topics in the masters program,

as listed above. In other words, even if an applicant should hold high competence in MS as such, or in economics in general, this would not be sufficient to qualify for this professorship unless the MS/economics competence is clearly related to the core of the masters program.

In addition, the announcement states that experience in leading and promoting international interdisciplinary research teams and documented skills in raising funds for research should be given preference. Finally, in order to qualify the applicant must document good pedagogical performance.

Evaluation of each applicant

Odd Godal, (born 1970) holds a PhD in economics (2005) from the University of Bergen. His dissertation was on emission trading. After obtaining his PhD he has been working as a post doctoral fellow and research fellow in the School of Business, Economics and Law at Göteborg University, and in the Economics Department at the University of Bergen. He has furthermore been senior researcher at the Rokkan Centre in Bergen. Presently, he is research fellow at SNF, Bergen. He has previously (2008) been found qualified for a full professorship in the field of climate change and environmental economics at the NHH.

Scientific publications

Godal has published 13 papers in journals with peer review process, of which six after completing his PhD, i.e. during the years 2006-2011. Three of these papers have been published in leading (level 2) journals, i.e. *Journal of Economic Dynamics and Control; Journal of Environmental Economics and Management, and Scandinavian Journal of Economics.* In addition he has one chapter in a book published by a level 2 publisher (*Edward Elgar).* His other papers have mainly been published in journals specialized to climate change and energy.

Godal's primary research interest has been devoted to the economics of climate change. Within this field he has published research related to two subjects: emission permit

trading and global warming potentials. In addition, he has published one paper on greenhouse gas taxation and one paper on pre-Kyoto proposals for greenhouse gas abatement targets.

A major part of his output has concentrated on emission permit markets (8-9 papers, three of which are unpublished). Excluding two unpublished manuscripts the papers are joint works with one or more colleagues. These papers cover quite a large spectrum of separate problems in this field. In these papers Godal develops economic theory on exchange and market interactions using climate agreements (Kyoto) as examples. In other papers, he studies problems in emission trading as such. His results are derived applying optimization, game theory and numerical simulation. These works appear to be innovative, mathematically rigorous and of high quality.

Godal's other main contributions are in the field of Global Warming Potentials (GWP). Three of the papers are original articles in level 1 journals, one is an editorial essay (in a level 1 journal). Excluding the essay the papers are joint works with two, three and five colleagues. One merit of this work is its interdisciplinary nature (atmospheric physics, meteorology and economics). Taken together these four papers can be taken as competent interdisciplinary work with high policy relevance.

Teaching, supervision and administration

Godal has teaching experience in game theory, mathematics for economists and microeconomics, mainly at the University of Bergen. His teaching experience is still relatively modest. However, he has (jointly) supervised 11 master degree theses and performed some consultancy work. He has presented papers at international conferences and workshops and he has acted as a referee for 7 journals.

Summary

Given that 6-8 qualified publications are required for a full professorship, Godal fulfils this criterion. He has developed innovative mathematical and quantitative models and optimizing decision support tools which are clearly within the requirements laid down in the announcement text. In addition, his two main fields of research are within the core of

this professorship but most clearly concentrated to environmental economics and less so on energy and natural resources. Even though his research is somewhat narrow in scope, we find him qualified for the professorship.

Irina Gribkovskaia (born 1958) holds a PhD in physics and mathematics from the University of Belarus, Minsk (1985) on a dissertation on differential equations for development of theory and algorithms for dynamic systems with the hierarchy of speeds. She is presently professor in quantitative logistics at Molde University College, a position she has held since 2008. Before this, she has been associate professor at Molde University College 1999-2006.

Scientific publications

Gribkovskaia lists some 20 refereed articles. Six of these articles have appeared in A-level journals (level 2) such as *Omega* and *European Journal of Operational Research*, In addition, she has recently submitted two articles to leading journals and she has published a number of discussion papers and papers for refereed proceedings.

Gribkovskaia has a publication record in terms of volume and scientific level that is clearly sufficient for a full professorship. The question then remains whether her research is within the field of this specific professorship. Together with her application, Gribkovskaia has submitted 15 articles for evaluation, amongst which 13 have appeared in refereed journals and two have been submitted.

Gribkovskaia's research falls in two broad categories. 1. Mathematics and methods within operational analysis, and 2. Operational analysis applied to transportation and logistics. Some of these articles are related to oil and gas, e.g. paper #1 written together with Shyshou et al on supply vessel planning in offshore oil and gas operations and #2 with Quian et al on helicopter management in offshore helicopter transportation, #9 on supply servicing of offshore platforms and #10 on routing supply vessels to petroleum installations. Still, very little of Gribkovkaia's research can be specifically related to energy, natural resources and environmental economics as such.

Other relevant experience and competence

Gribkovskaia is involved in a research project on congestion management in the electricity market as well as two projects on scheduling in the offshore industry and supply chain management in the oil and gas industry. She has been visiting professor at leading international universities and she has acted as referee for leading OA journals. During her engagement at Molde University College she has taught masters courses in logistics. She lists 23 MSc dissertations that she has supervised since 2000, mainly theses within logistics. Since 2006 she has supervised five PhD students, two having completed so far.

Summary

Irina Gribkovskaia has published extensively in leading journals within logistics and operational analysis. In general terms, she is qualified for a professorship. She has clearly contributed in the field of Management Science. However, her works do not contain contributions related to market mechanism or economy wide interactions nor econometric applications. Her scientific production is outside what is strictly speaking the core of the masters program to which the position is allocated. Still, based on an overall evaluation of her scientific publications and that the applicant should be qualified in Management Science or in Economics we find her, although under some doubt, qualified for the professorship.

Dag Haugland (born 1960) holds PhD in informatics from the University of Bergen (1991). His dissertation was on "Optimization methods for blending models in oil refineries" and thus clearly inside the MS domain. After the PhD he has been working as a research scientist and consultant. Since 2000 he has been associate professor in optimization at Department of Informatics, University of Bergen.

Scientific publications

Haugland has published 16 articles in scientific journals with a peer review process and 17 in books and conference proceedings. Three of the papers [1, 7, 9] have been published in level two journals. Most of the papers have been written with one or two colleagues.

Haugland's primary subject is optimization and management science applied to exploitation of petroleum fields, pipeline transportation of natural gas and to problems related to wireless networks, vehicle routing and data compression.

Taking the submitted papers, nine [1, 3, 4, 15, 24, 32, 34, 36, 37] belong to the field of management science applied to energy and natural resources. Papers [1] and [3] develop optimization models for petroleum field exploitation and apply mixed integer programming. Papers [4, 24, 36, 32, 37] analyse the pooling problem in refinery planning models. The studies apply and develop various optimization methods like global optimization and bilinear optimization. Papers [15, 34] study natural gas pipeline transportation and compressibility. All these papers are of high quality and they solve clearly identifiable open problems and present new contributions. These papers include economic components but at a level of a single organization, i.e. they do not analyse market interactions or broader economic or social science questions related to energy, natural resources or environment.

The remaining selected papers [7, 8, 9, 11, 16, 33] consider vehicle routing and wireless networks. Although these papers apply methods like tabu search (that can be applied in the field of energy, natural resources and environment) they are difficult to be interpreted as belonging to the core subjects relevant here.

Teaching, supervision and administration

Haugland has been an associate professor over several years and has solid experience in teaching subjects like optimization, programming, numerical methods and mathematics. He has supervised a number of PhD and master students and his CV mentions four research projects.

Summary

Given that 6-8 high quality publications are required to be qualified as a professor, Haugland fulfils this criterion. In the context of this professorship his scientific work most clearly concentrates on management science methods and approaches, applied to

energy, oil and gas. This raises the question of whether Haugland's research falls within the core of the subjects to be covered for this professorship.

Obviously, management of petroleum field exploitation, gas transmission networks and refinery planning is related to energy economics. However, this work does not contain contributions related to market mechanisms or economy wide interactions nor econometric applications. In addition, a substantial part of Haugland's scientific production is outside what is strictly speaking the core of the masters program to which the position is allocated. Still, based on an overall evaluation of his scientific publications and that the applicant should be qualified in Management Science or in Economics we find him qualified for a professorship in energy, natural resources and environmental economics.

Stein Ivar Steinshamn (born 1959) is Dr oecon (PhD) from NHH (1992). His thesis had the title: "Economic evaluation of alternative harvesting strategies for fish stocks". He has worked at SNF since defending his thesis, and is Research Director at the Centre for Fisheries Economics since 2007. He has previously (2008) been found qualified for a full professorship in the field of climate change and environmental economics at the NHH.

Scientific publications

On his CV, Steinshamn lists some 31 articles published in international refereed journals, the majority with one or two co-authors. Of the 15 submitted articles, one third is in level 2 journals, viz. *Journal of Environmental Economics and Management; American Journal of Agricultural Economics, and Journal of Economic Dynamics and Control.* Other papers have appeared in more specialized journals, mainly within natural resource modelling and marine resource economics. Steinshamn has also written 8 book chapters, one of which at a leading publisher (*Oxford University press).* His research is solidly placed within the Natural Resource and Environmental Economics tradition. Only two enclosed papers are directly related to environmental economics topics [18,26], yet most of the other papers though applied to fisheries, involve modelling highly relevant for a broad number of natural resources, as well as environmental issues.

Other relevant experience and competence

Steinshamn is professor II at the Department of Finance and Management Science at NHH. In this connection he supervises several PhD students and teaches courses in Environmental, Resource and Energy Economics. He has also previously taught micro, macro and mathematical economics both at NHH and UiB, both graduate and undergraduate levels, as well supervised graduate students. He has lead a large number of different research projects within environmental, resource, energy and development economics, as well as climate policy and he has acted as referee for a significant number of international journals.

Summary

There is no doubt that Steinshamn has solid competence within economic theory and dynamic optimisation especially, and he stands out as highly qualified in Natural Resource and Environmental Economics. He has already been found qualified for a professorship in Climate and Environmental Economics at NHH. Though he has no published research applied to energy specifically, his research spans game theory, static and dynamic optimisation, capital theory, etc, which all are highly relevant for Energy Economic issues. Based on this the committee is of the opinion that Steinshamn qualifies for the professorship.

Göran Wall (born 1951) holds a PhD in Physical Resource Theory (1986) from Chalmers Tekniska Högskola (CTH) Gothenburg, Sweden. His PhD thesis was entitled "Exergy – a useful concept". Since his dissertation he has held a number of lecturer and assistant professorship positions at different institutions, and is currently (since 2008) Professor of Energy Engineering at the Gotland University, Sweden.

Scientific publications

Wall has published almost 20 peer reviewed journal publications, about half of which are level 2, as well as a number of book chapters. In the majority of these papers he is either the sole or first author. Of the 15 papers that are enclosed in the application, 3 are

submitted, one is in the Encyclopedia of Energy and the remainder are journal publications.

Wall's research is mainly concentrated on different aspects of thermodynamics, especially focussing on issues connected to exergy. Though traditionally a natural science topic, thermodynamics also has linkages to economics via sustainability measurement, thermoeconomics, sustainable development and resource accounting, topics that appear in many of Wall's papers [2,3,6,7,9,11,12,14,15]. Wall has also linked energy more closely to social science issues [8], as well published overview presentations [4,5].

Other relevant experience and competence

Wall has a Master's degree in Education (2007), and has taught a vast number of different courses mainly within Energy and Energy Economizing at the graduate level, and has also developed compendiums. He has tutored a large number of graduate students as well as post graduates. His CV lists four research projects which he has lead. He has been the key note speaker at several conferences, and has been invited to speak at many institutions.

Summary

Wall is already qualified as Professor in Physical Resource Theory at his current place of employment. It remains to be determined whether he is also qualified within the context of this professorship. His scientific work is solidly placed within the natural science of energy, and some of his work has connections to economic aspects of energy, as represented above. This raises the question as to whether Wall is qualified for a broader professorship with heavy weight on interdisciplinary research and teaching in energy, natural resources and environmental economics. Wall's research is relatively remote from more traditional Energy Economics research. On the other hand, his research relating to natural resources and the environment, although not mainstream economics, may yield interesting input to the interdisciplinary program to which this professorship is allocated. Under some doubt, the committee therefore concludes that Wall is qualified for the professorship in Energy, Natural Resource and Environmental Economics.

Conclusions

The committee's interpretation of the requirements laid down in the announcement texts goes as follow. In order to qualify for this professorship in "Energy, Natural Resources and Environmental Economics", it is not sufficient to have a general competence in management science or economics alone. The competence must relate to the economics and management of energy and/or natural resources and the environment. This interpretation of the announcement text is based upon the strong references made to teaching and supervising in the NHH masters program in energy, natural resources and the environment.

There were five applicants to this professorship. Based on *general* evaluation criteria, all five applicants are qualified for a professorship. Based on the criteria specific to this professorship as outlined above, we have found two of the applicants clearly qualified for the professorship, i.e. Godal and Steinshamn. Under some doubt related to how to weight the requirements in the announcement text regarding management science or economics and the link to the masters program in energy, natural resources and the economy, we have also found the three other applicants qualified, i.e. Haugland, Wall and Gribkovskaia, although under a certain amount of doubt. Regarding the ranking of the five, the committee is of the opinion that Steinshamn has documented a wider research as regards the topics and subjects that we interpret as the core of this professorship. Godal has a narrower competence. As regards the ranking of the remaining three, we clearly rank Wall and Haugland ahead of Gribkovskaia. We, furthermore find it quite difficult to distinguish between Wall and Haugland. However, Haugland's work appears to be more directly related to energy economics.We therefore have the following ranking

1 Steinshamn

2 Godal

3 Haugland

4. Wall

5 Gribkovskaia

Needless to say, our evaluation and ranking is based solely on written material and specifically on our interpretation of the announcement text as regards required disciplinary and thematic competence. The hiring and decision making bodies at NHH may, of course, decide to assign different weights on the scientific competences.

Finland/Norway, September 21, 2011

Olli Tahvonen Claire Armstrong Ole Gjølberg