# *Petroleum System Modelling*
## *as uniquely applied to the MSGBC BASIN STUDIES by First Exchange Corp*

Dr. Andy Carr has uniquely developed a more complete basin modelling methodology incorporated using theoretical reasons for his procedures and yielding important Supplemental results to the Petroleum Explorationist as regards to generation timing and hydrocarbon yields, compared to the limitations of standard models, that FEC also provides.

Successfully predicting risks in petroleum exploration must involve the complete integration of all the geochemical, geological and physical factors occuring within a basin into a model that allows exploration geoscientists to fully understand the basin's dynamics and its oil and gas generation history. *This requires:*

*1) the determination of subsidence, uplift and thermal histories though time, and*

*2) the determination whether or not there was HC generation, and if there were the commercial quantities and the phases of such generated hydrocarbons.*

*Hydrocarbon charge failures* are considered by FEC to be the most common reason for unexpected E&P well results. Outcomes vary from dry holes related to the lack of maturity, to trapping mechanisms post-dating migration as has been the recent case in northern Senegal and southern Mauritania, to the unexpected discovery of gas rather than the predicted oil. Consequently in our MSGBC Basin Studies, we have placed our greatest emphasis on applying complete basin modelling and also integrating oil and gas geochemistry hard data biomarkers as a means of crosschecking the basin models.

Dr. Andrew Carr has led our Petroleum Systems initiative since 1999 and his Modelling methods account beyond normal Basin Models to account for subsidence and uplift histories though time through the base of the lithosphere using depth seismic for the upper sedimentary section and for the deeper levels gravity and magnetic data resulting in a thermal history model that accounts for increased heat flow during uplift events.

Having derived the thermal history from Physics, this thermal history is then calibrated using kinetic models for vitrinite reflectance, while other kinetics are used to determine the timing, phase and volumes of petroleum generation. The 'normal' kinetic models however contain a fundamental flaw in that *they do not conserve energy*. Since the laws of thermodynamics in all natural systems must be obeyed, incomplete petroleum system modelling prediction that does not account for and obey relevant physical laws can never be correct, except conceivably by chance. See a more detailed following Explanation.

Please contact FEC should further information be required, either on our basin modelling procedures or our reports, wells and other data in the MSGBC Basin.

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