

Some economic aspects of feed-in tariffs and green certificate schemes

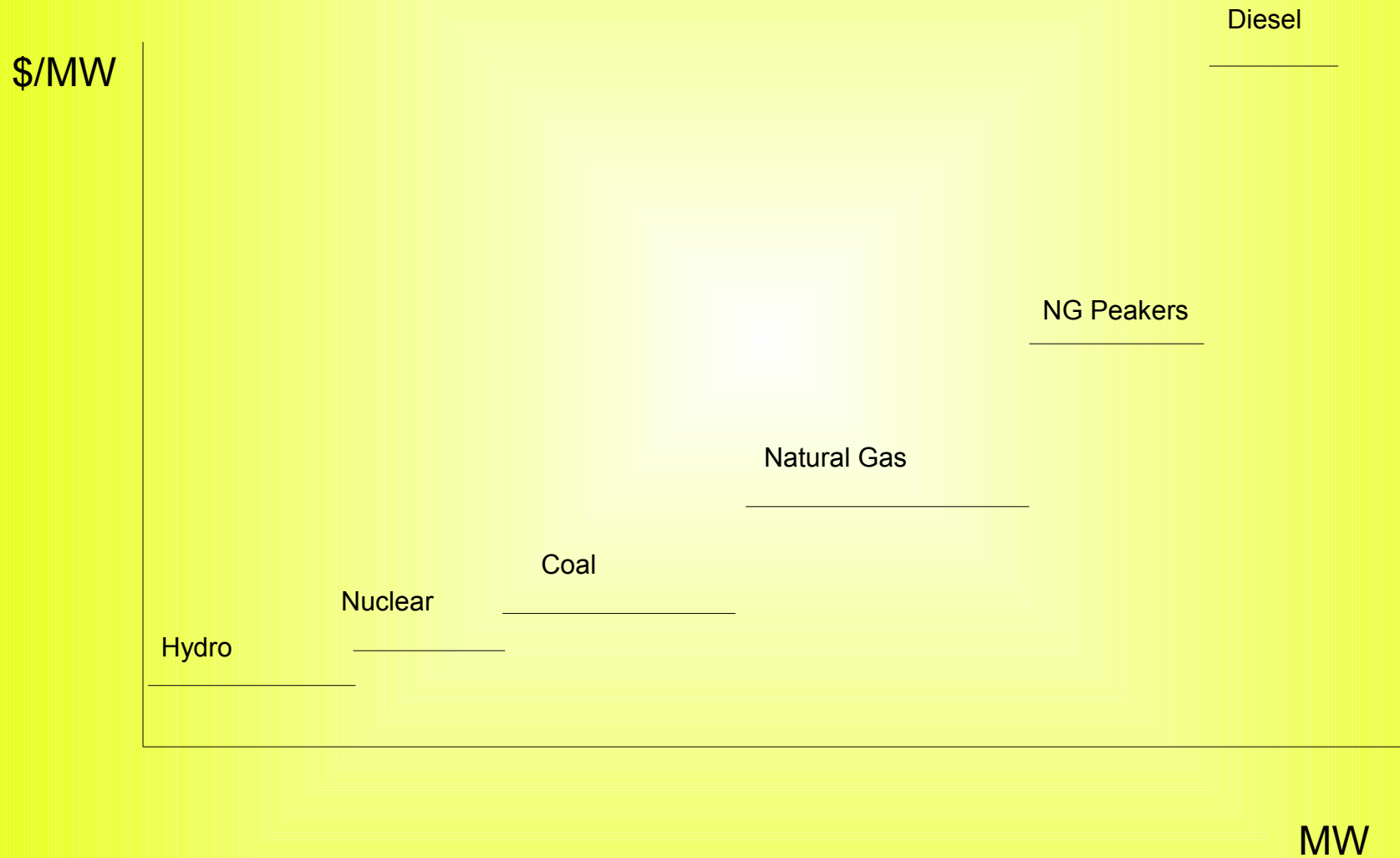
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Arne Kildegaard, Ph.D.
Associate Professor of Economics
University of Minnesota, Morris

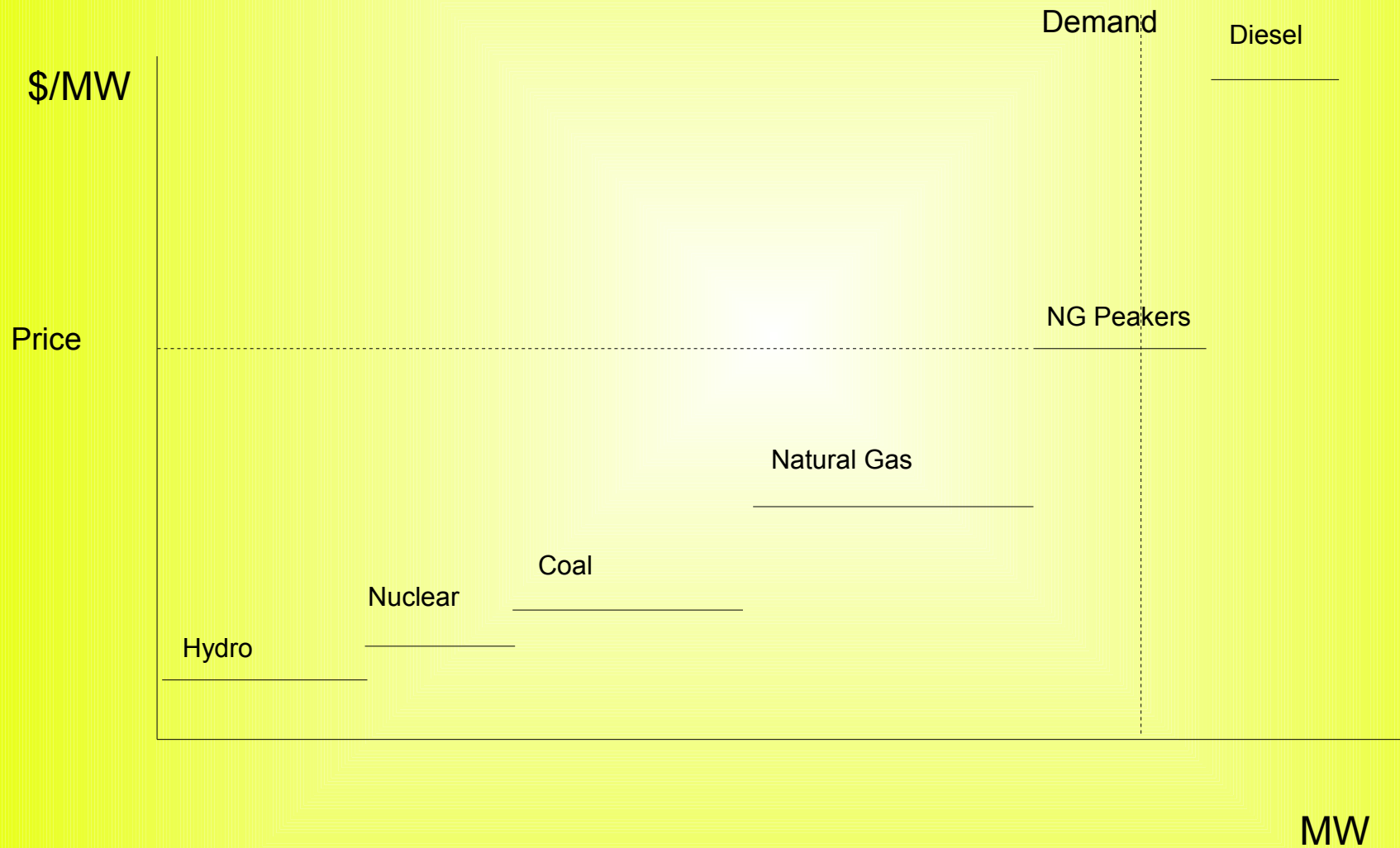
Some economic aspects of feed-in tariffs and green certificate schemes

- Merit order effects
 - FITs: a policy that pays for itself?
- Political prices vs. political quantities
 - FITs vs. green certificate/RES approaches
- Local matters

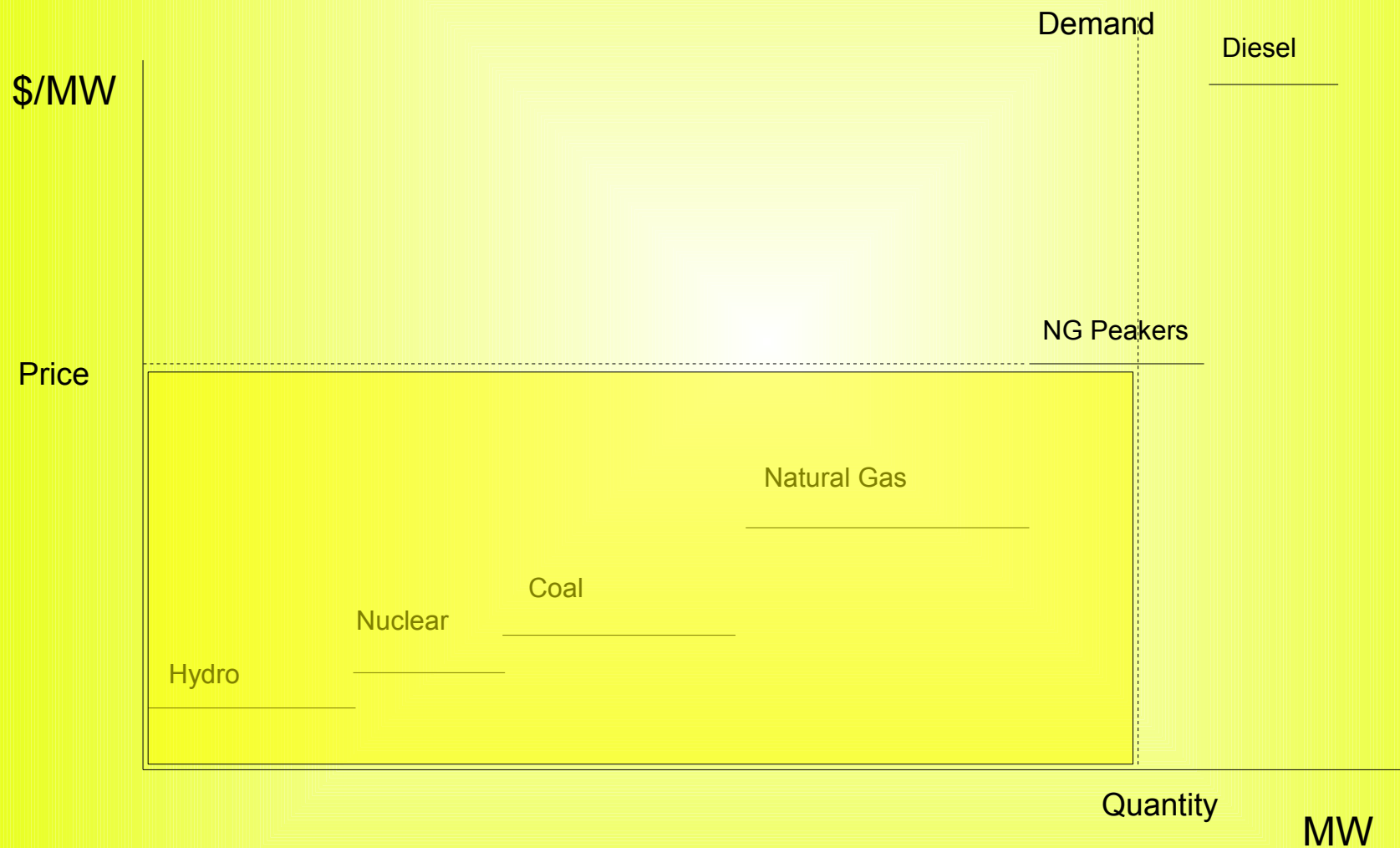
1. Merit order effects: wholesale price determination



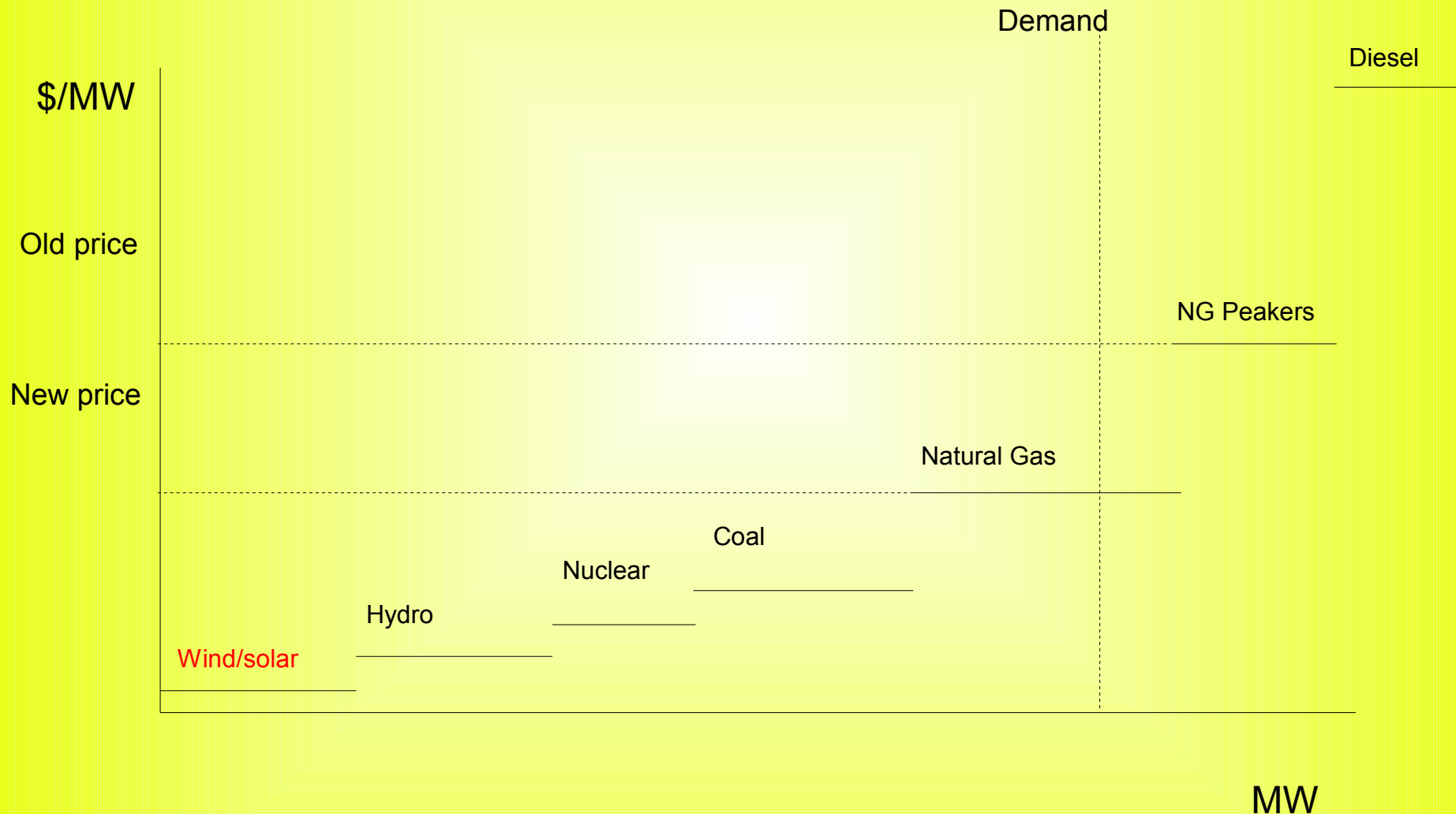
1. Merit order effects: wholesale price determination



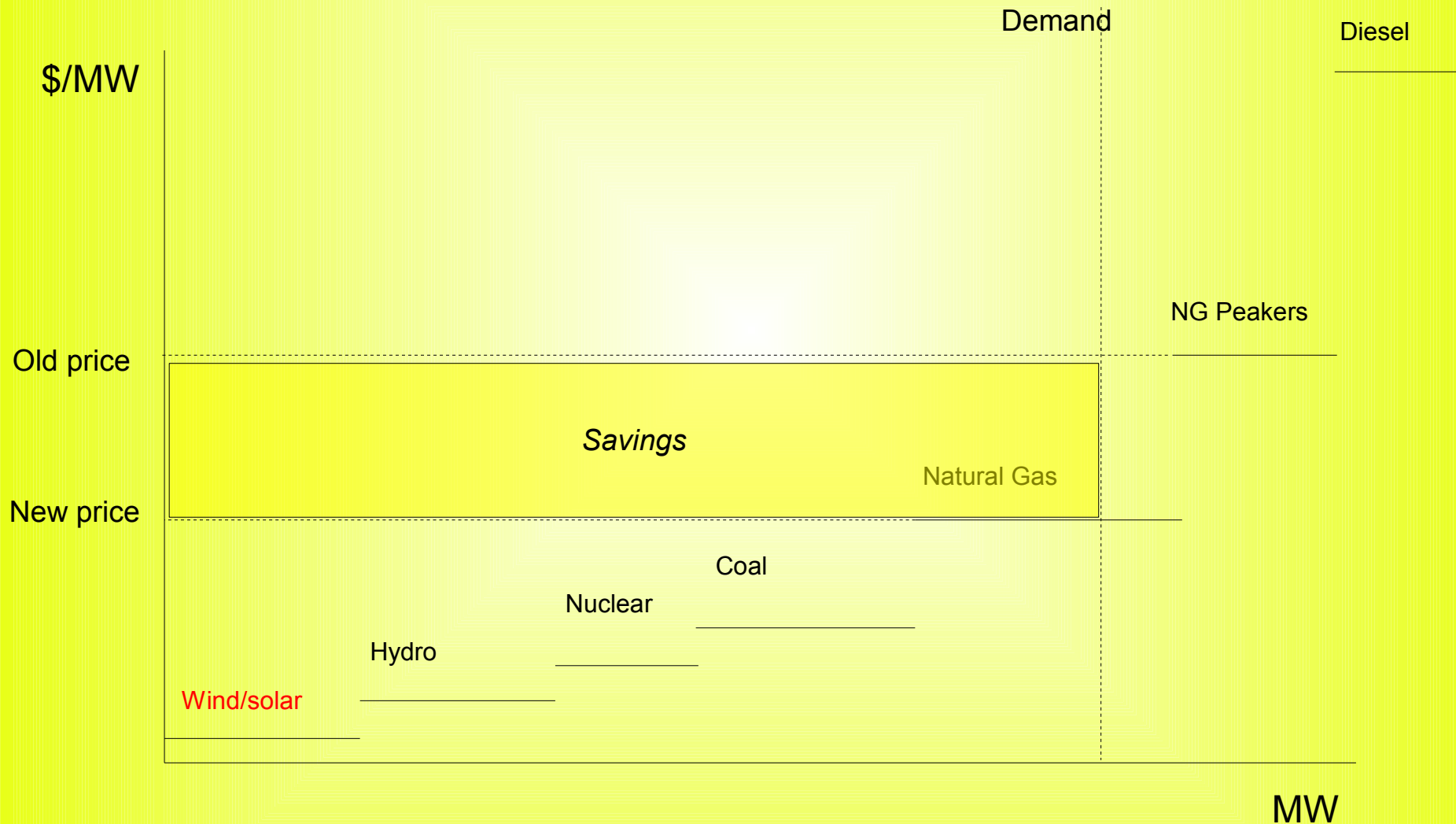
1. Merit order effects: total cost determination



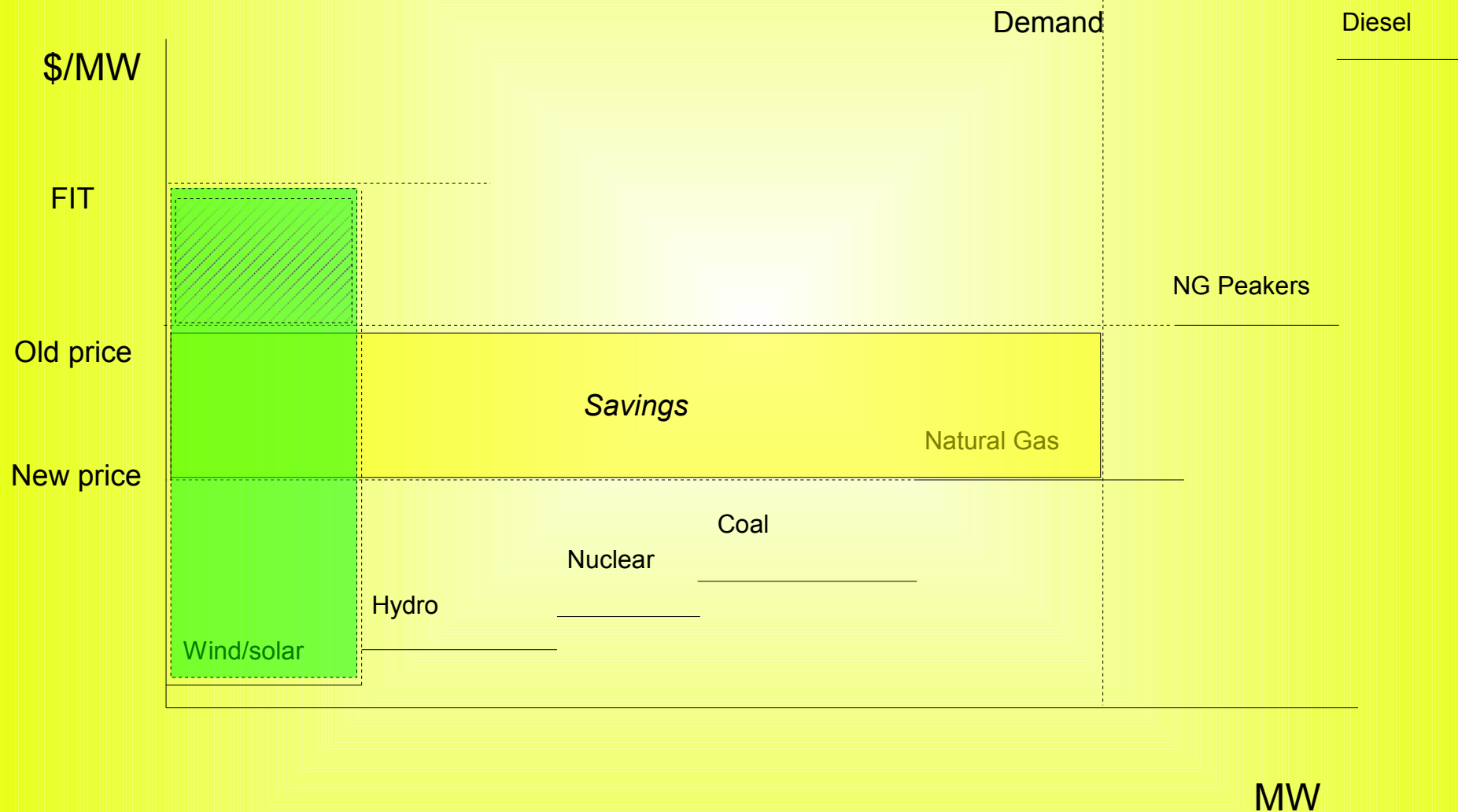
1. Merit order effects: adding low-marginal cost renewables



1. Merit order effects: reduced wholesale electricity payments



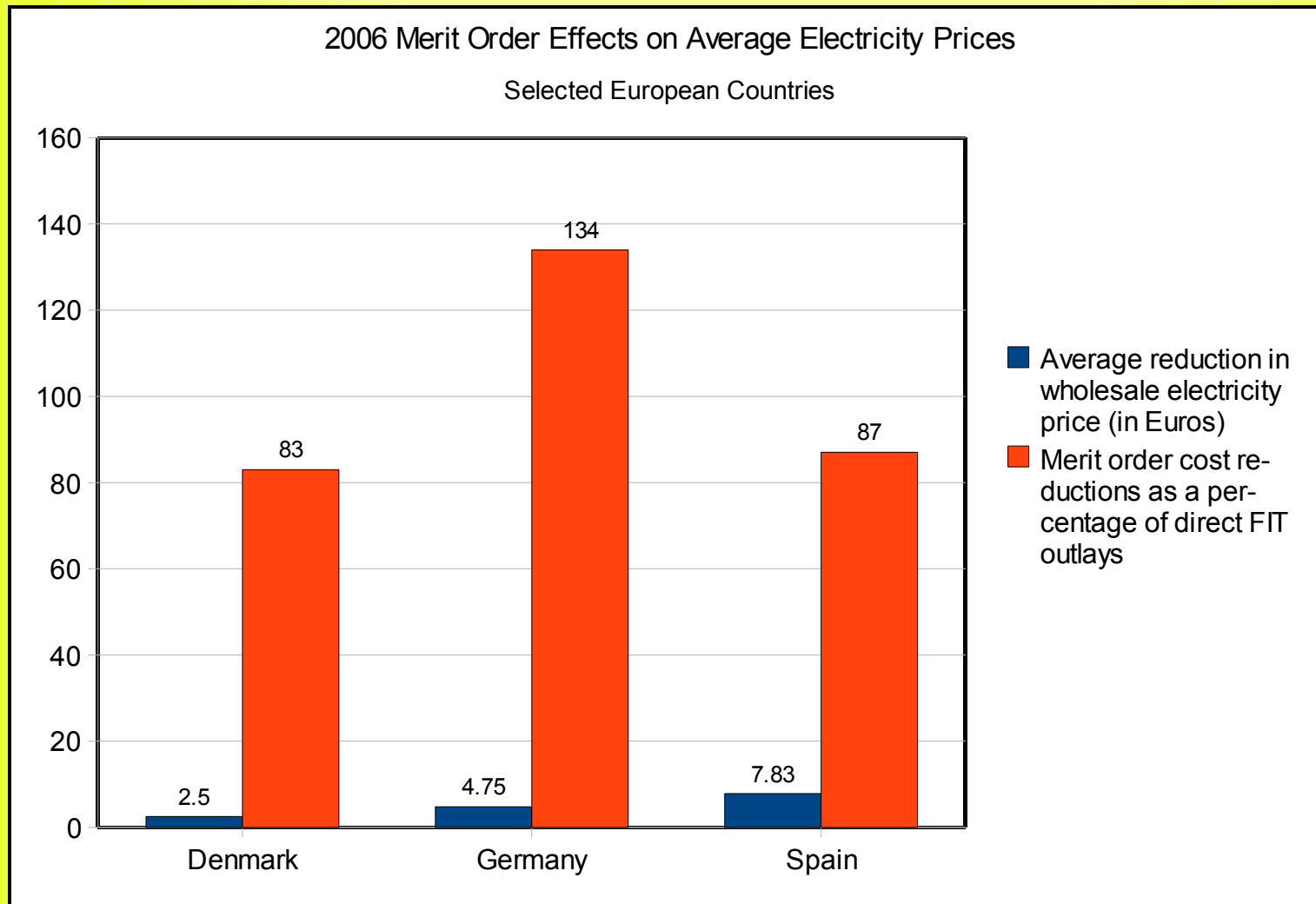
1. Merit order effects: comparing costs of FITS with 'merit order savings'



1. Recent research on merit order effects

- Sensfuss,et al. (2008): “The merit order effect a detailed analysis of the price effect of renewable electricity on spot market prices in Germany,” *Energy Policy* 36, 3086-3094.
- Saenz de Meira et al. (2008): “Analyzing the impact of renewable electricity support schemes on power prices: the case of wind electricity in Spain.” *Energy Policy* 36, 3345-3358.
- Munksgaard and Morthorst (2008): "Wind power in the Danish liberalised power market--Policy measures, price impact and investor incentives." *Energy Policy* 36 (2008), 3940-3947.

1. Recent research on merit order effects: Key findings



2. Political prices vs. political quantities

- FITs
 - Prices determined politically
 - Quantities determined by the market
- Green Certificate/RES
 - Quantities determined politically
 - Prices determined by the market

2. Political prices vs. political quantities: recent research

- Mitchell, et al. (2006): “Effectiveness through risk reduction: a comparison of the renewable obligation in England and Wales and the feed-in system in Germany.” *Energy Policy* 34 (2006), 297-305.
- Kildegaard (2008): “Green certificate markets, the risk of over-investment, and the role of long-term contracts.” *Energy Policy* 36 (2008), 3413-3412.
- Toke (2007): “Renewable financial support systems and cost-effectiveness.” *Journal of Cleaner Production* 15 (3), 280-287.

2. Political prices vs. political quantities: Key findings of recent research

- FITs lower revenue risk, which leads to cheaper financing and more adoption
 - - “Less risk” is a substitute for “more money”
- The German FIT has delivered more renewables than the British RO
 - - Cheaper, too (despite inferior German wind resource)
- Hedging certificate price risk is more expensive for non-diversified energy producers
 - - This favors ownership by utilities and other integrated energy producers
 - - Discourages ownership by smaller, independent, local-ownership teams

3. Local matters: recent research

- Kildegaard and Myers-Kuykindall (2006): “Does it matter who develops the wind in Big Stone County, MN?” Final report, IREE Grant No. SG P4c 2004.
 - Conservative estimate of local spending pattern in construction phase
 - Liberal estimate of local financing and tax appetite
 - Key finding: local ownership has ~3x the local economic impact (incomes and jobs), relative to outside ownership (paying only land leases)

3. Local matters: anecdotal evidence suggests FITs are “friendlier” than RES/green certificates to local ownership

- CBED underwhelms us in MN
- >80% local ownership in Denmark
 - similar % in Germany
- Avoids unpleasantness of PPA negotiation
 - artificial transactions cost “economies of scale” favoring large developers

Conclusion

- FITs are largely self-financing, through merit-order effects
- Neither the FITs nor the Green Certificate/RES approach is inherently more “market oriented”
- The Green Certificates/RES approach advantages corporate ownership structures, which may lead to NIMBYism or even BANANA

Which way to turn, MN?



...Questions...?

