Implications for Crude Oil Carbon Intensity Differentiation under the LCFS

California Energy Commission
Transportation Committee Workshop
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Summary Findings

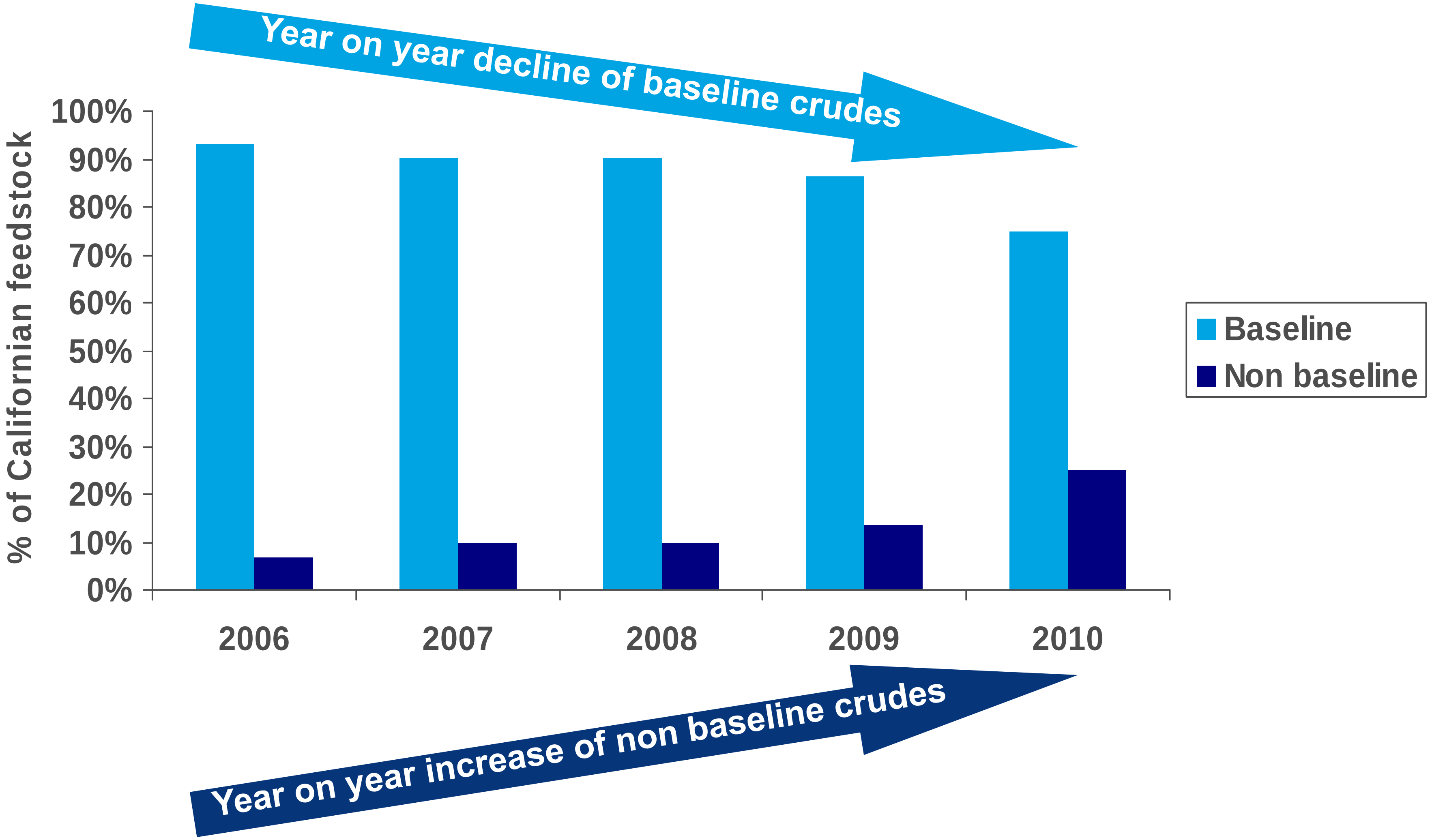
- **Crude oil markets are global and producers have alternatives to investment in GHG abatement, with consequences, such as**
  - Increase in GHG emissions from crude oil “shuffling” as tankers passing each other with near-by “high intensity” crudes oils displaced by long-haul “low intensity”
  - Potentially reduce refinery operational efficiency due to sub-optimal crude slates
  - Substantially negative impacts on refiner margins

- **Under the LCFS we expect refiners to prefer processing 2006 baseline crudes**
  - Results in a more restricted crude feedstock
  - Llikely to increase security of supply concerns as some 2006 baseline production declines

- **High carbon crude oils, which could be deflected from California by the LCFS, will still be produced and instead supply markets where no carbon policy exists**

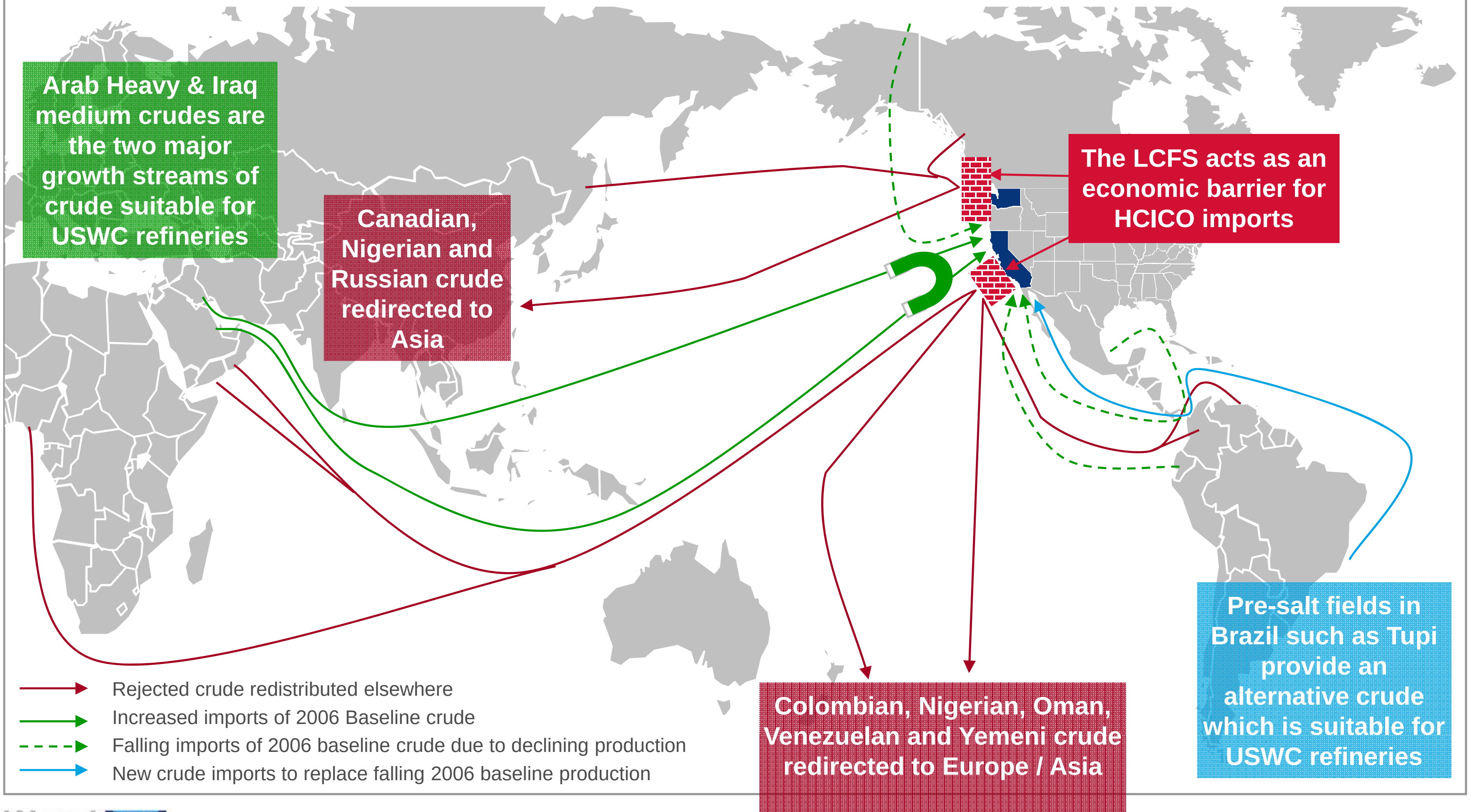
- **Cost of crude oil differentiation may…**
  - Not be borne by crude oil producers
  - Find its way into petroleum product consumer prices

Californian refineries increasingly are processing non-2006 baseline crudes



Source: IEA, CEC, Wood Mackenzie

LCFS is likely to push regional HCICOs into Asia and increasingly draw in 2006 baseline crudes from the Middle East, increasing GHG freight emissions



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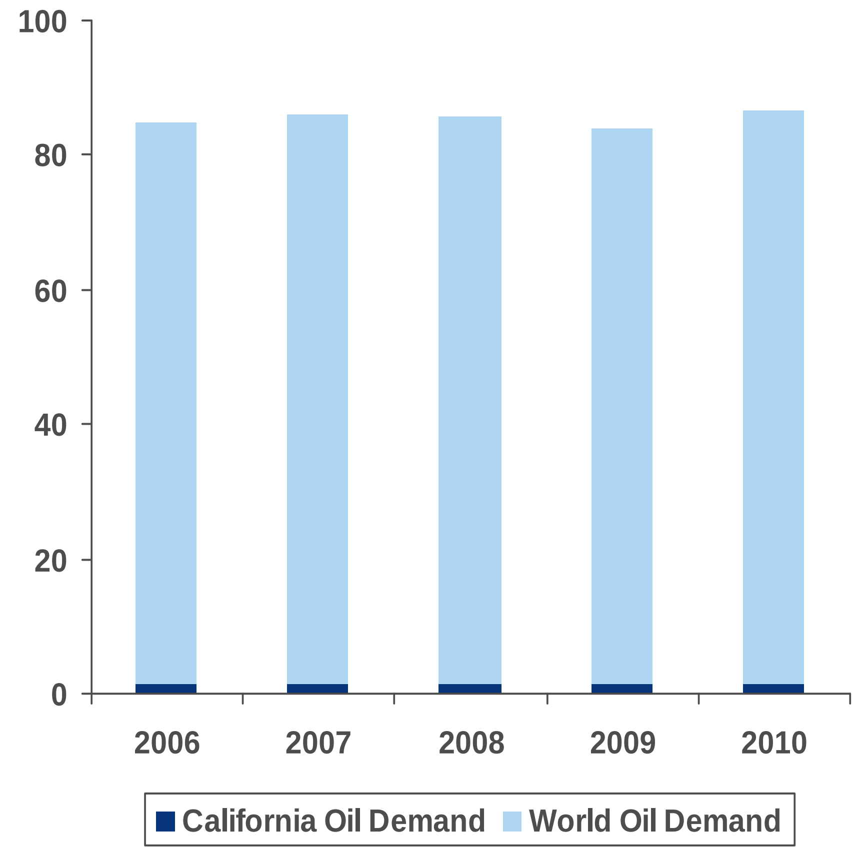
Global crude oil market is large and high carbon crudes rejected by one market are likely to supply markets where no carbon cost exists

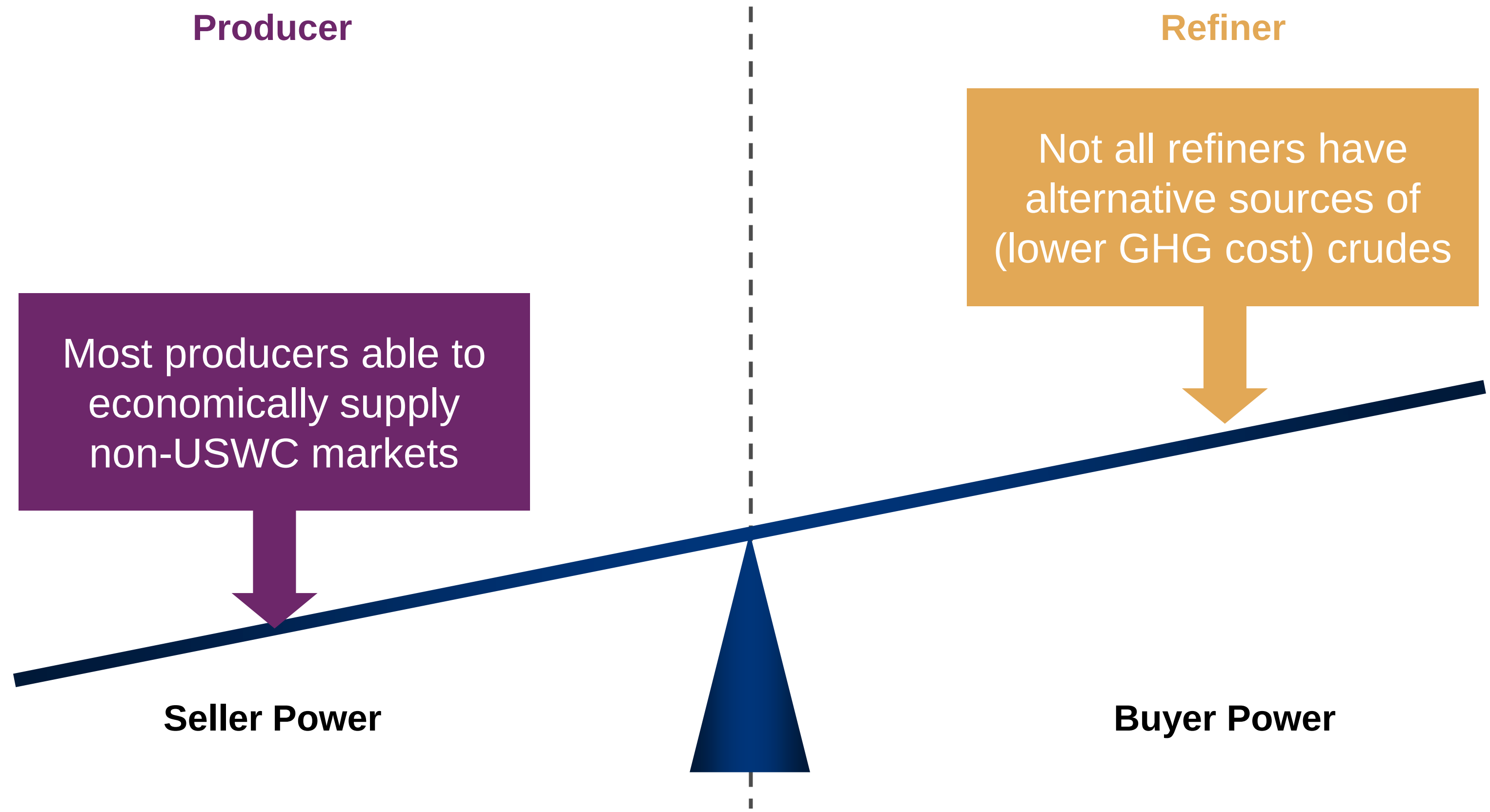
- Total world demand for crude oil is approximately 85 million barrels a day
- Californian crude oil demand represents less than 2% of world demand
- High carbon crude oils, which could be deflected from California by the LCFS, will still be produced and instead supply markets where no carbon policy exists

World Oil Demand (milion b/d)



Source: Wood Mackenzie

Most crude suppliers to PADD V markets have other supply options so producers potentially are unlikely to pay all of the crude GHG burden



If producers have alternative markets, they might force the cost of compliance on refiners

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