

Picos del gas y del petróleo, reservas de carbón y cambio climático

*IV Encuentro de Economía Ecológica Española
(11-12 junio, Santiago de Compostela)*

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Introducción

La Curva de Hubbert

$$\dot{P} = rP \left(1 - \frac{P}{P_{\infty}} \right)$$

	<i>URR (Gboe)</i>	
<i>Función de extracción</i>	<i>Petróleo=2,100 Gas natural=1,700</i>	<i>Petróleo=3,300 Gas natural=3,000</i>
	<i>bajo</i>	<i>alto</i>
Hubbert	Hubbert bajo	Hubbert alto
Meseta	Meseta bajo	Meseta bajo
Asimétrica	Asimétrica bajo	Asimétrica alto

Funciones de extracción

- Tipo meseta

$$\Pi(t) = \left\{ \begin{array}{ll} e^{-\frac{(t-\tau_{peak\ up})^2}{2\sigma^2}} \cdot \frac{1}{\sqrt{2\pi\sigma}} & t \leq \tau_{peak\ up} \\ \frac{1}{\sqrt{2\pi\sigma}} & \tau_{peak\ down} \leq t \leq \tau_{peak\ down} \\ e^{-\frac{(t-\tau_{peak\ down})^2}{2\sigma^2}} \cdot \frac{1}{\sqrt{2\pi\sigma}} & t \geq \tau_{peak\ down} \end{array} \right.$$

$$\dot{P}(t) = P_\infty \frac{\Pi(t)}{\left(\frac{\tau_{peak\ down} - \tau_{peak\ up}}{\sqrt{2\pi\sigma}} \right) + 1}$$

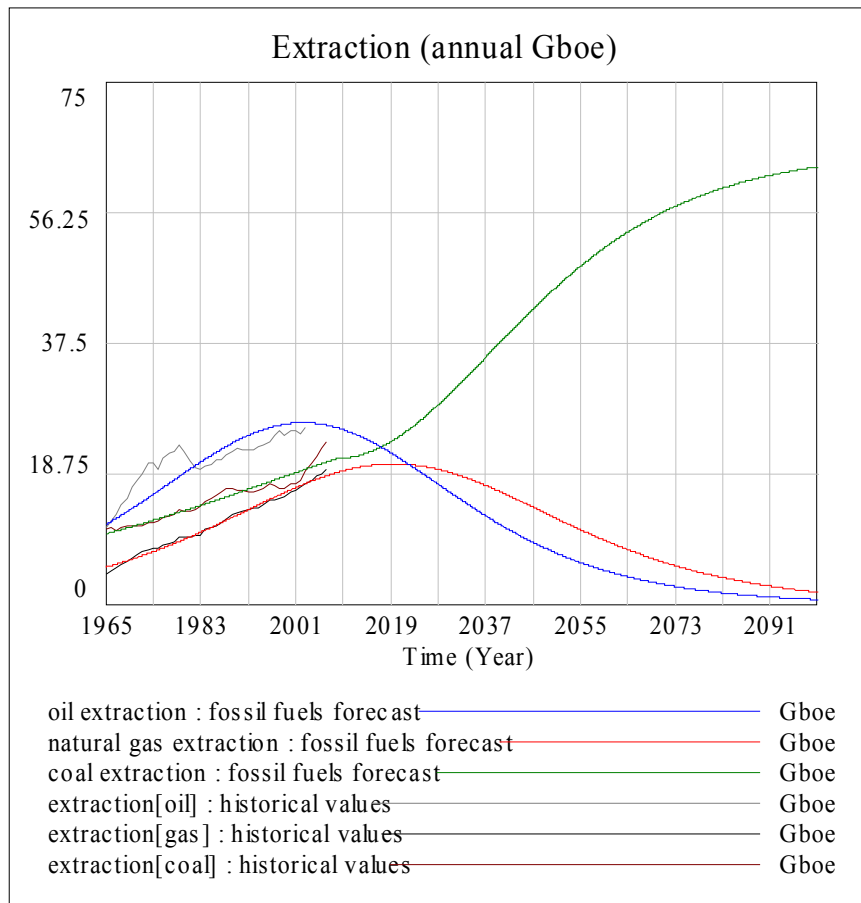
- Asimétrica

$$\Pi(t) = \left\{ \begin{array}{ll} e^{-\frac{(t-\tau_{peak})^2}{2\sigma_1^2}} \cdot \frac{1}{\sqrt{2\pi\sigma_1}} & t \leq \tau_{peak} \\ e^{-\frac{(t-\tau_{peak})^2}{2\sigma_2^2}} \cdot \frac{1}{\sqrt{2\pi\sigma_2}} & t \geq \tau_{peak} \end{array} \right.$$

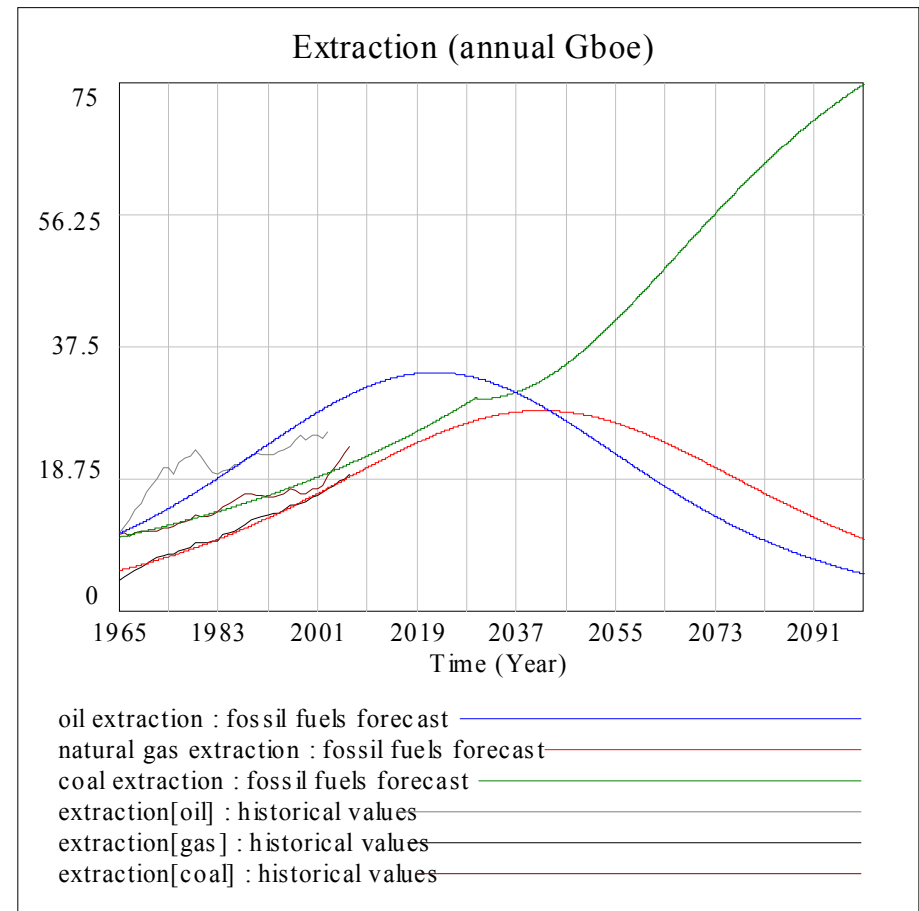
$$\dot{P}(t) = P_\infty \frac{\Pi(t)}{\frac{1}{2} \left(1 + \frac{\sigma_2}{\sigma_1} \right)}$$

Sendas de extracción

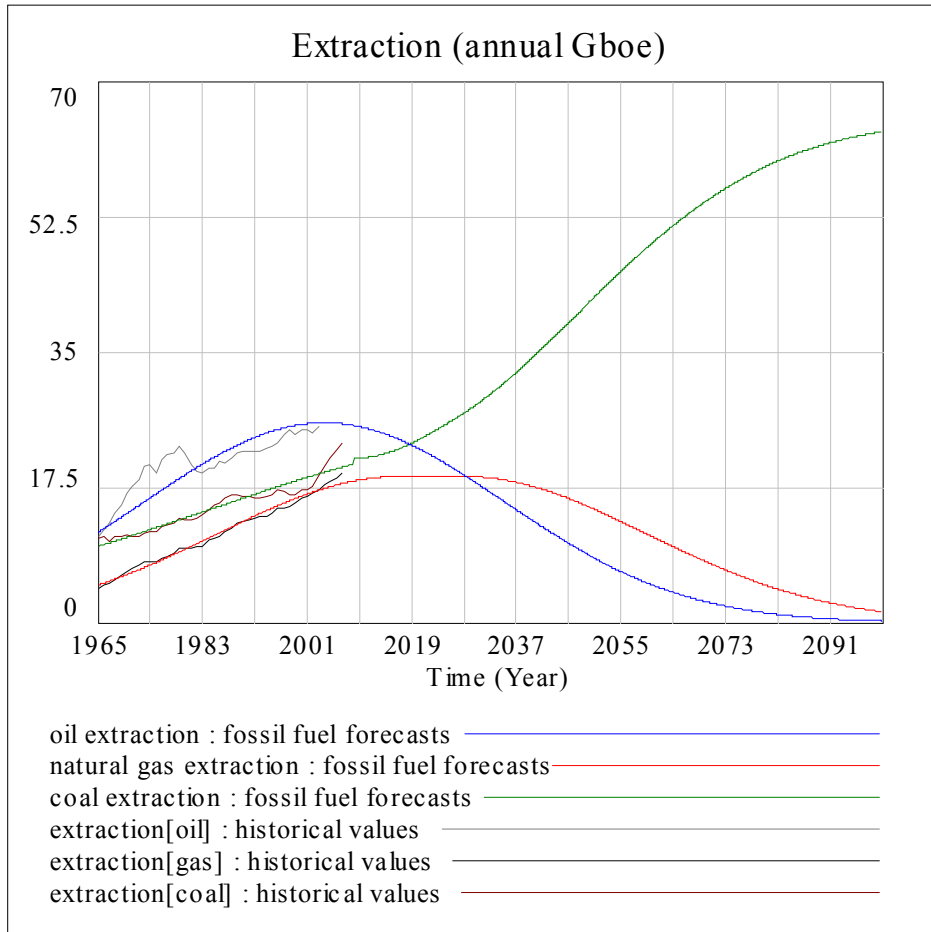
- Hubbert bajo



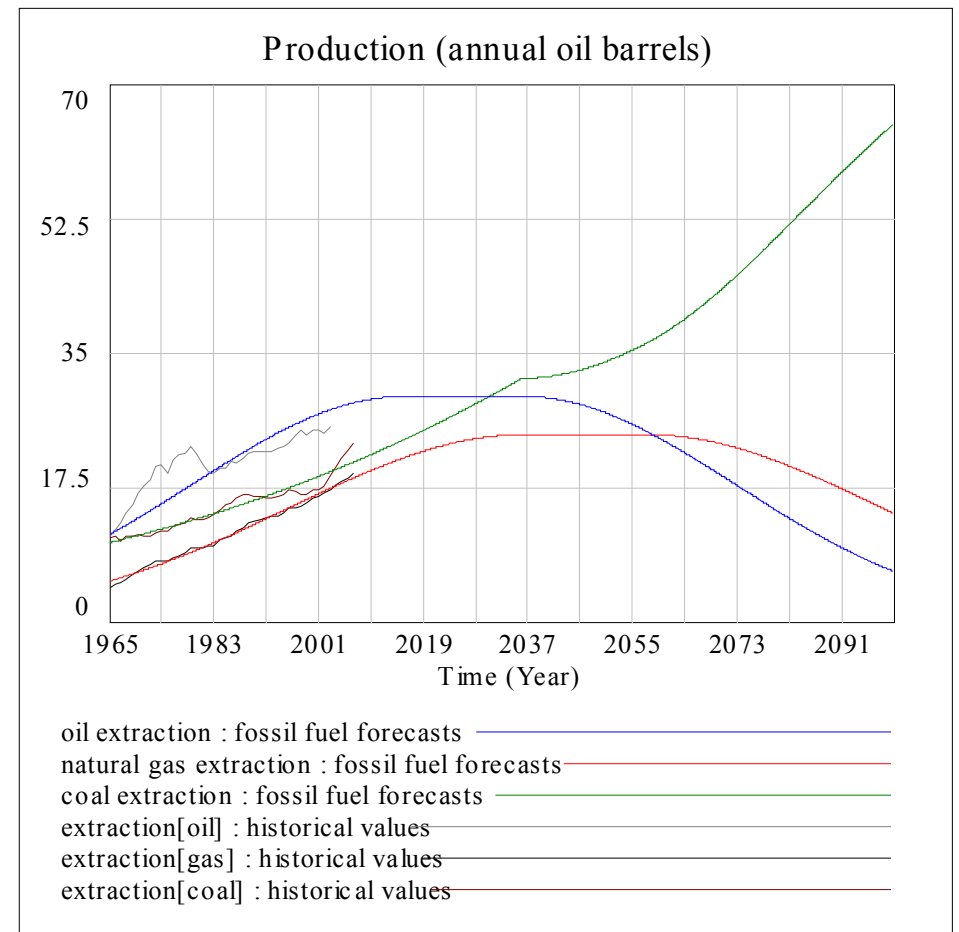
- Hubbert alto



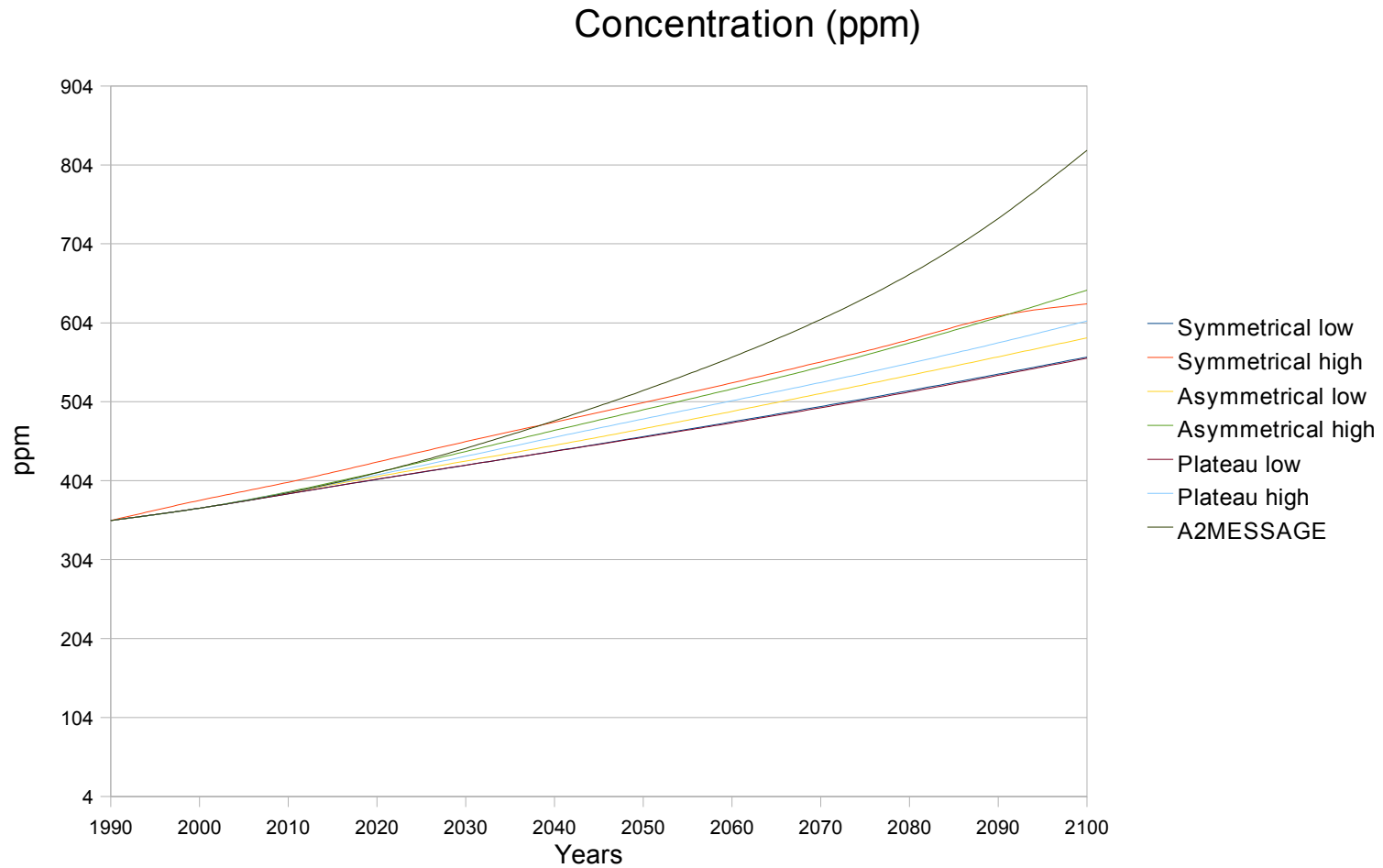
- Meseta bajo



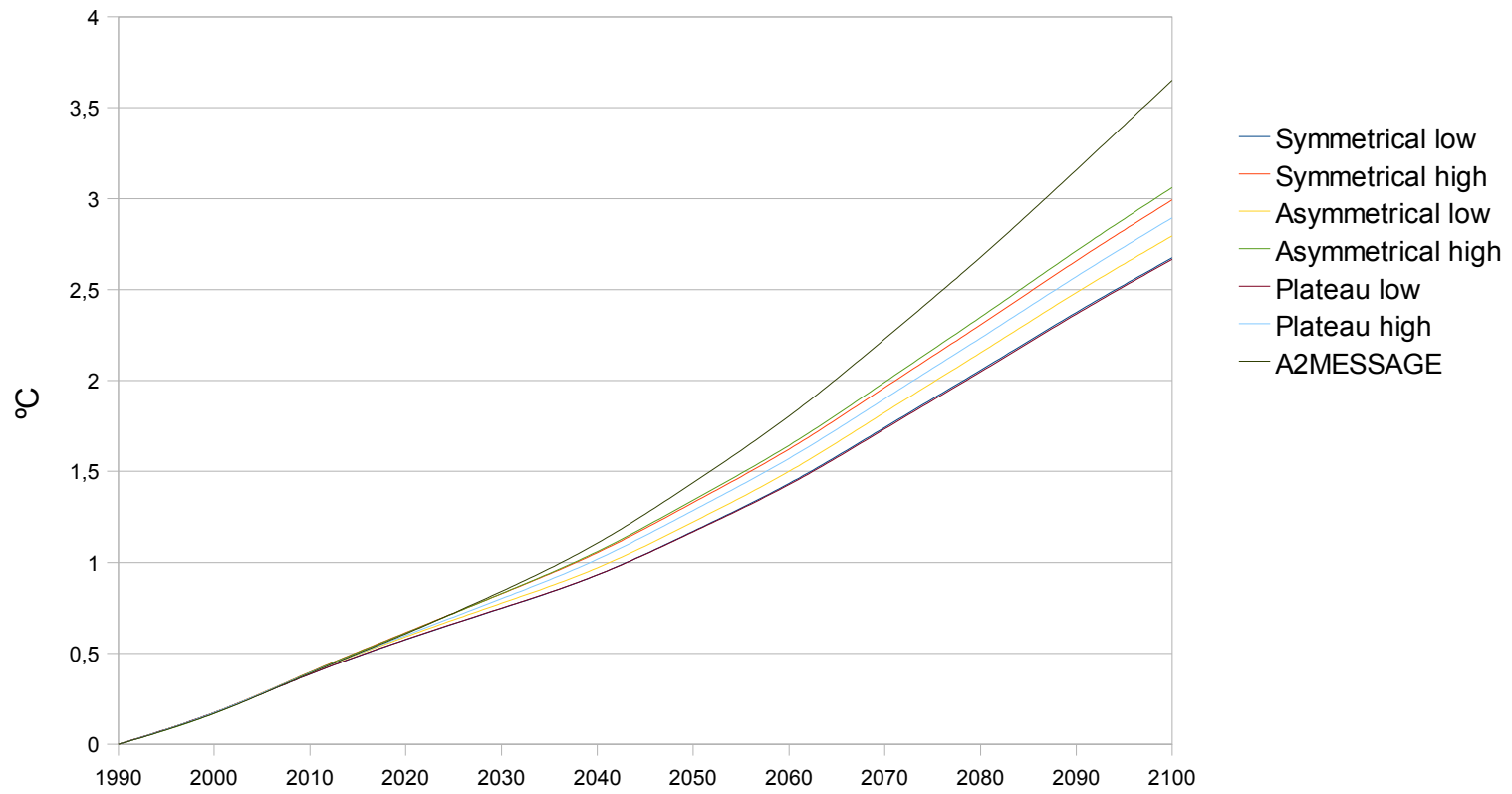
- Meseta alto



Efectos climáticos



Temperature increase (since 1990)



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