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Air Quality Health Benefits Calculator

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November 19, 2020

Presentation Outline

- What is the Air Quality Health Benefits Calculator?
- When should the Commission use this tool?
- AQ Health Benefits Calculator details
- Tool example
- Questions?

What is the Air Quality Health Benefits Calculator?

- A reduced-form Excel-based tool to evaluate the human health benefits of EPIC projects that reduce or mitigate air pollutant emissions, either at an individual project level or across a project portfolio.

- Designed for use by CEC staff to estimate the human health benefits of avoided emissions:
  - Changes in morbidity and mortality risk and
  - Associated social welfare value of these changes.

When should the Commission use this tool?

Environmental Defense Fund

- Emissions change data associated with a project (or portfolio) are available:
  - Fine particulate matter ($PM_{2.5}$)
  - Nitrogen oxides (NOx)
  - Sulfur dioxide (SO_2)
- These emissions change data are **not** geographically specific.
- Demographic details about the exposed population are **not** known.
- This tool is designed to be simple and flexible for regular use; based on sound science.

Input Data

Changes in $PM_{2.5}$, NOx, and SO_2 emissions by year and sector.

Emissions changes are calculated by either:

- EPIC Emissions Calculator
  - Emissions Species: CO_2, CH_4, N_2O, NOx, SO_2, $PM_{2.5}$
  - Data: U.S. EPA's Emissions & Generation Resource Integrated Database (eGRID) and Continuous Emission Monitoring System (CEMS)
- U.S. EPA's AVERT Tool
  - Emissions Species: CO_2, NOx, SO_2, $PM_{2.5}$
  - Large-scale or portfolio level changes in demand
- Or are provided by the EPIC grant applicant/recipient.

Tool Structure: Inputs

Agreement #	EPC-14-005					
Solicitation #	PON-13-303					
Solicitation	Advancing Utility-Scale Clean Energy Generation					
Company	The Regents of the University of California, San Diego					
Project Title	Solar Forecast Based Optimization of Distributed Energy Resources in the LA Basin and UC San Diego Microgrid					
Project Description	This project aims to integrate high-accuracy solar forecasting to optimize the operation of distributed energy resources, and utilize the value of solar forecasting in utility Grid-Operations to improve grid reliability, reduce ratepayer costs and increase safety. The objectives are to apply forecasts to inform control and scheduling decisions for distributed energy resources with emphasis on energy storage and electric vehicle charging control at warehouse photovoltaic clusters in the LA-Orange-Riverside-San Bernardino- San Diego Counties as well as the UCSD microgrid.					
Source	https://industrialeconomics.sharepoint.com/_x_/1/sites/CLCLPIC-ILCandPTs/_layouts/15/Doc.aspx?sourcedoc=%7B4A00					

Benefit(s) Description	Measurement Units	Demo/Prototype Quantity	Maximum Potential in CA IOU territory	Quantity Associated with Plausible Impact Noted Above	Benefit Accrues to	
NOx Reductions	Metric tons/year	0.00313	3.13	0.0313	N/A	
NOx Reductions	Short tons/year	0.00345	3.45023	0.03450	N/A	

EGU Avoided Emissions Inputs (short tons)						
Year		PM 2.5	NOx	SO2	Source	
2018					Applicant/grantee	
2019					Applicant/grantee	
2020			3.45023		Applicant/grantee	
2021			3.45023		Applicant/grantee	

Tool Structure: Benefit Per Ton Value Data

Source: United States Environmental Protection Agency Office of Air and Radiation. Estimating the Benefit per Ton of Reducing PM2.5 Precursors from 17 Sectors. February 2018. Tables 7 - 12.
Lower = Krewski et al. (2009); Upper = Lepeule et al. (2012)

Summary of the total dollar value (mortality and morbidity) per ton of directly emitted PM2.5, SO2, and NOx reduced by sectors (by year for 2020, 2025, and 2030)

Year	2020	2020	2020	2020	2020	2020	2020	
Discount Rate	3%	3%	3%	3%	3%	3%	7%	
Source	Lower Estimate	Lower Estimate	Lower Estimate	Upper Estimate	Upper Estimate	Upper Estimate	Lower Estimate	Lower
Sector	PM 2.5	SO2	NOx	PM 2.5	SO2	NOx	PM 2.5	
Aircraft, locomotives and marine vessels	$302,044	$103,558	$8,738	$668,812	$237,321	$19,417	$269,682	
Area sources	$399,130	$60,409	$9,709	$906,133	$140,235	$21,575	$366,768	
Cement kilns	$453,066	$53,936	$7,012	$1,024,793	$118,660	$16,181	$409,917	
Coke ovens	$560,939	$64,724	$12,945	$1,294,476	$151,022	$30,204	$507,003	
Electric arc furnaces	$539,365	$100,322	$11,866	$1,186,603	$226,533	$28,047	$485,428	
Electricity generating units	$161,809	$45,307	$6,688	$377,555	$103,558	$15,102	$151,022	
Ferroalloy facilities	$355,981	$56,094	$5,609	$809,047	$129,448	$12,945	$323,619	
Industrial point sources	$604,089	$107,873	$17,260	$1,402,349	$248,108	$38,834	$539,365	
Integrated iron and steel	$625,663	$507,003	$20,496	$1,402,349	$1,186,603	$46,385	$560,939	
Iron and steel facilities	$388,343	$55,015	$8,414	$873,771	$129,448	$19,417	$345,193	
Non-road mobile sources	$334,406	$50,700	$7,875	$755,111	$118,660	$18,338	$302,044	
Ocean-going vessels	$56,094	$15,102	$2,265	$129,448	$33,441	$5,070	$50,700	
On-road mobile sources	$453,066	$24,811	$9,385	$1,024,793	$56,094	$21,575	$409,917	
Pulp and paper facilities	$194,171	$57,173	$4,746	$431,492	$129,448	$10,679	$172,597	
Refineries	$388,343	$83,062	$8,306	$895,346	$194,171	$18,338	$355,981	
Residential wood combustion	$453,066	$118,660	$16,181	$1,035,580	$280,470	$37,756	$409,917	
Taconite mines	$106,794	$43,149	$7,767	$248,108	$97,086	$17,260	$96,007	

| Intro | User Guide | Inputs | Human Health Benefits Results | Benefit Per Ton Value Data | Morbidity and Mortality Effects | Deflators |

Tool Structure: Outputs

- Discounted present dollar value of public health benefits over time.
- Annualized dollar value of health benefits.
- Incidence of avoided mortalities/morbidities.

PRESENT VALUE AND ANNUALIZED BENEFITS

PV AND ANNUALIZED BENEFITS (ALL POLLUTANTS & SECTORS)

	Lower Estimate	Upper Estimate
Present Value	$483,006	$1,077,616
Annualized	$26,232	$58,524

TOTAL BENEFITS (ALL SECTORS)
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DISCOUNTED VALUE OF HEALTH BENEFITS BY YEAR (NET PRESENT VALUE)

Year	Lower Estimate PM 2.5	Lower Estimate NOx	Lower Estimate SO2	Upper Estimate PM 2.5	Upper Estimate NOx	Upper Estimate SO2	Lower Estimate ll Pollutants	Upper Estimate ll Pollutants
2018								
2019								
2020		$23,487			$53,035		$23,487	$53,035
2021		$22,803			$51,490		$22,803	$51,490
2022		$22,139			$49,990		$22,139	$49,990
2023		$23,227			$52,001		$23,227	$52,001
2024		$22,551			$50,486		$22,551	$50,486
2025		$21,894			$49,016		$21,894	$49,016
2026		$21,256			$47,588		$21,256	$47,588
2027		$20,637			$46,202		$20,637	$46,202
2028		$21,531			$47,847		$21,531	$47,847
2029		$20,904			$46,453		$20,904	$46,453
2030		$20,295			$45,100		$20,295	$45,100
2031		$19,704			$43,787		$19,704	$43,787
2032		$19,130			$42,511		$19,130	$42,511
2033		$18,573			$41,273		$18,573	$41,273

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Questions?

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