

## DEEMED SAVINGS TECHNICAL ASSUMPTIONS

### Product: Business New Construction Energy Design Assist (EDA) and Energy Efficient Buildings (EEB)

#### Description:

**EDA** is a custom product including electric and gas measures. This product relies heavily on expert consultants in the design process; however, we will perform independent project review in accordance with standard engineering methods. Customer may apply for rebate under the New Construction product.

**EEB** is a holistic program primarily comprised on prescriptive measures for lighting, heating and HVAC programs, custom items are evaluated using the custom model process.

#### Algorithms:

Electrical and gas energy savings and electrical demand savings will be calculated based on the project-specific details. Each project will undergo an engineering review in accordance with standard engineering practices. Prescriptive items within the project will be handled through their respective deemed products.

#### Lighting New Construction

Customer kW	$(Code\_LPD - Design\_LPD) \times Area \times Cooling\_kW\_Savings\_Factor / 1000$
Customer kWh	$(Code\_LPD - Design\_LPD) \times Area \times Space\ Hours \times Cooling\_kWh\_Savings\_Factor$
Customer PC kW	Customer kW x CF
Incremental Electric Cost	Customer kWh x Incremental_Cost_per_kWh
Incremental Electric O&M	$(Code\_LPD - Design\_LPD) \times Area \times Space\ Hours \times Heating\_Penalty\_Factor \times Incremental\_O\_M\_per\_Dth$
Electric Rebate	Customer PC kW x Rebate_per_PCKW + (Customer kW - Customer PC kW) x Rebate_per_kW

#### Variable ID:

Value	Description
99%	Per filings and settlement with State of colorado the Gas EDA Net To Gross is 99% and Gas Energy Efficient Building track is 97%. The Electric Net To Gross for EDA and EEB are both 95%. Product requirements are well above code, so we feel free-ridership will be negligible as incremental cost generally increases with performance above minimum code
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Facility Type	Customer Input	Type of building or area where lighting is installed
Code_LPD	Table 1	Code minimum lighting power density (Watts / sqft). Depends on applicable code year.
Design_LPD	Customer Input	Efficient design lighting power density (Total Watts / Total Area)
Area	Customer Input	Square footage of the building or area where lighting is installed
Cooling_kW_Savings_Factor	Table 3	Cooling system secondary Demand Savings factor resulting from efficient lighting. Reduction in lighting Demand results in a Reduction in Cooling Demand, if The Customer has air conditioning. Existence of air conditioning to be provided by customer.
Cooling_kWh_Savings_Factor	Table 3	Cooling system secondary energy savings factor resulting from efficient lighting. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence of air conditioning to be provided by customer. Confirmation of air conditioning is verified
Heating_Penalty_Factor	Table 3	Heating system secondary energy penalty factor resulting from efficient lighting. Reduction in lighting demand results in an increase in heating usage, if the customer has gas heating. (Dth/kWh)
Space Hours	Table 2	Annual Operating Hours (The building area type is supplied by the customer)
CF	Table 2	Coincidence Factor is the probability that the peak demand of the lights will coincide with the peak utility system demand, determined by Building Area Type.
Rebate_per_PCKW	\$500	In alignment with rebate structure for custom programs
Rebate_per_kW	\$100	In alignment with rebate structure for custom programs
Incremental_Cost_per_kWh	\$0.30	Deemed project incremental cost based on historical new construction Lighting projects from the CO Lighting Program. (\$/Customer kWh)
Incremental_O_M_per_Dth	\$5.24	Deemed commodity cost of natural gas (\$/Dth)
Measure Life	Table 4	Useful life of the installed equipment

**Tables:**

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**Table 1: Interior Lighting Power Allowances (References 1,2,3,4)**

Building Area Type	Code_LPD (W/SF) 2009 IECC	Code_LPD (W/SF) 2012 IECC	Code_LPD (W/SF) 2015 IECC	Code_LPD (W/SF) 2018 IECC
Automotive facility	0.90	0.90	0.80	0.71
Convention center	1.20	1.20	1.01	0.76
Courthouse	1.20	1.20	1.01	0.90
Dining: bar lounge/leisure	1.30	1.30	1.01	0.90
Dining: cafeteria/fast food	1.40	1.40	0.90	0.79
Dining: family	1.60	1.60	0.95	0.78
Dormitory	1.00	1.00	0.57	0.61
Exercise center	1.00	1.00	0.84	0.65
Fire Station	1.00	0.80	0.67	0.53
Gymnasium	1.10	1.10	0.94	0.68
Health care clinic	1.00	1.00	0.90	0.82
Hospital	1.20	1.20	1.05	1.05
Hotel/motel	1.00	1.00	0.87	0.75
Library	1.30	1.30	1.19	0.78
Manufacturing facility	1.30	1.30	1.17	0.90
Motion picture theater	1.20	1.20	0.76	0.83
Multifamily	0.70	0.70	0.51	0.68
Museum	1.10	1.10	1.02	1.06
Office	1.00	0.90	0.82	0.79
Parking garage	0.30	0.30	0.21	0.15
Penitentiary	1.00	1.00	0.81	0.75
Performing arts theater	1.60	1.60	1.39	1.18
Police Station	1.00	1.00	0.87	0.80
Post office	1.10	1.10	0.87	0.67
Religious building	1.30	1.30	1.00	0.94
Retail	1.50	1.40	1.26	1.06
School/University	1.20	1.20	0.87	0.81
Sports arena	1.10	1.10	0.91	0.87
Town hall	1.10	1.10	0.89	0.80
Transportation	1.00	1.00	0.70	0.61
Warehouse	0.80	0.60	0.66	0.48
Workshop	1.40	1.40	1.19	0.90

**Table 2: Stipulated Annual Lighting Hours and Peak Demand Coincident Factors by Building Area Type (references 5,6)**

Building Area Type	Space Hours	Coincidence Factor
Automotive facility	3068	94%
Convention center	4156	94%

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Courthouse	2278	96%
Dining: bar lounge/leisure	5571	68%
Dining: cafeteria/fast food	5571	68%
Dining: family	5571	68%
Dormitory	1924	25%
Exercise center	8234	94%
Fire Station	2697	51%
Gymnasium	2080	73%
Health care clinic	3890	65%
Hospital	7616	76%
Hotel/motel	3140	37%
Library	5010	71%
Manufacturing facility	4618	81%
Motion picture theater	3506	53%
Multifamily	1924	25%
Museum	3068	94%
Office	2884	54%
Parking garage	6084	96%
Penitentiary	2697	51%
Performing arts theater	2278	96%
Police Station	2697	51%
Post office	3435	78%
Religious building	2085	48%
Retail	4786	83%
School/University	3395	63%
Sports arena	2278	96%
Town hall	3435	78%
Transportation	5913	96%
Warehouse	5242	68%
Workshop	4618	81%

**Table 3: HVAC Interactive Factors. Reference 7**

HVAC_Type	Cooling_kWh_Savings_Factor	Cooling_kW_Savings_Factor	Heating_Penalty_Factor (Dth/kWh)
Heating only	1.00	1.00	-0.000508
Heating and cooling	1.13	1.33	-0.000508

**Table 4: Equipment Lifetimes. Reference 5**

Measure	Lifetime
EDA Project (Electric & Gas)	20
EEB Project (Electric & Gas)	20
Lighting New Construction	15

## DEEMED SAVINGS TECHNICAL ASSUMPTIONS

### Assumptions:

Operation and Maintenance Savings will be calculated for each specific project based on project details.

Per previous filings and settlement with State of Colorado the lifetime of these products are 20 years for gas and electric measures.

### References:

1. 2009 IECC
2. 2012 IECC
3. 2015 IECC
4. 2018 IECC
5. State of Illinois Energy Efficiency Technical Reference Manual Final Technical Version as of February 8th, 2017. Effective January 1st, 2018. (Hours and CF)
6. Historical paramaters from EEB Lighting offering
7. HVAC Interactive Factors developed based on the Rundquist Simplified HVAC Interaction Factor method for Colorado, ASHRAE Journal - "Calculating lighting and HVAC inte