

```

1 from flask import Flask, render_template_string, request
2
3 app = Flask(__name__)
4
5 # HTML template
6 HTML_TEMPLATE = """
7 <!DOCTYPE html>
8 <html lang="zh">
9 <head>
10   <meta charset="UTF-8">
11   <title>LCC STUDENT personal carbon footprint calculator</title>
12   <style>
13     body {
14       font-family: Arial, sans-serif;
15       margin: 40px;
16       background-color: #f9f9f9;
17     }
18     h1 {
19       color: #2a7ae2;
20       text-align: center;
21     }
22     h3 {
23       color: #444;
24     }
25     label {
26       display: block;
27       margin-top: 10px;
28       font-size: 14px;
29     }
30     input[type="number"], input[type="checkbox"], select {
31       padding: 5px;
32     }
33     input[type="number"] {
34       width: 100px;
35       border: 1px solid #ccc;
36       border-radius: 4px;
37     }
38     button {
39       margin-top: 20px;
40       padding: 10px 20px;
41       background-color: #2a7ae2;
42       color: white;
43       border: none;
44       border-radius: 4px;
45       cursor: pointer;
46     }
47     button:hover {
48       background-color: #1a5bb2;
49     }
50     .result {
51       margin-top: 30px;
52       font-weight: bold;
53       background-color: #fff;
54       padding: 15px;
55       border: 1px solid #ddd;
56       border-radius: 4px;
57     }

```

```

58 .section {
59     margin-bottom: 20px;
60     background-color: #fff;
61     padding: 15px;
62     border: 1px solid #ddd;
63     border-radius: 4px;
64 }
65 .transport-type {
66     margin-top: 15px;
67     padding-top: 10px;
68     border-top: 1px dashed #eee;
69 }
70 .month-selector {
71     margin-left: 10px;
72     font-size: 12px;
73 }
74 .footer {
75     margin-top: 40px;
76     font-size: 12px;
77     color: #666;
78     line-height: 1.5;
79     border-top: 1px solid #eee;
80     padding-top: 15px;
81 }
82 </style>
83 </head>
84 <body>
85 <h1>LCC STUDENT personal carbon footprint calculatorper month</h1>
86 <form method="POST">
87     <div class="section">
88         <h3 ></h3>
89         <label >
90             <input type="number" name="numClothes" value="{ { numClothes } }"
91                 min="0">
92         </label>
93         <label >
94             <input type="checkbox" name="includeWashing" { { 'checked' if
95                 includeWashing else ' ' } }>
96         </label>
97         <label >
98             <input type="number" name="washesPerCloth" value="{ {
99                 washesPerCloth } }" min="0" { { 'disabled' if not
100                 includeWashing else ' ' } }>
101         </label>
102     </div>
103     <div class="section">
104         <h3 ></h3>
105         <label >
106             <input type="number" name="mealsVeggie" value="{ { mealsVeggie
107                 } }" min="0">
108         </label>
109         <label >
110             <input type="number" name="mealsMeat" value="{ { mealsMeat } }"
111                 min="0">
112         </label>
113         <label >

```

```

109         <input type="number" name="takeoutMeals" value="{{ takeoutMeals
110             }}" min="0">
111     </label>
112 </div>
113 <div class="section">
114     <h3 ></h3>
115     <label    > kWh
116         <input type="number" name="electricityKwh" value="{{
117             electricityKwh }}" min="0">
118     </label>
119     <label    >
120         <input type="number" name="dormArea" value="{{ dormArea }}" min
121             ="0">
122     </label>
123     <label    >
124         <input type="number" name="computerHours" value="{{
125             computerHours }}" min="0">
126     </label>
127 </div>
128
129 <div class="section">
130     <h3 ></h3>
131
132     <div class="transport-type">
133         <h4 ></h4>
134         <label    >/
135             <input type="number" name="busTrips" value="{{ busTrips }}"
136                 min="0">
137         </label>
138         <label    >/
139             <input type="number" name="busMetroAvgDistance" value="{{
140                 busMetroAvgDistance }}" min="0">
141         </label>
142         <label    >
143             <input type="number" name="bikeTrips" value="{{ bikeTrips }}"
144                 min="0">
145         </label>
146         <label    >
147             <input type="number" name="bikeAvgDistance" value="{{
148                 bikeAvgDistance }}" min="0">
149         </label>
150     </div>
151
152     <div class="transport-type">
153         <h4 ></h4>
154         <label    >
155             <input type="number" name="taxiTrips" value="{{ taxiTrips }}"
156                 min="0">
157         </label>
158         <label    >
159             <input type="number" name="taxiAvgDistance" value="{{
160                 taxiAvgDistance }}" min="0">

```

```

155     </label>
156     <label    >
157         <select name="taxiType">
158             <option value="gasoline" {{ 'selected' if taxiType == '
159                 gasoline' else '' }}>1.6 L</option>
160             <option value="diesel" {{ 'selected' if taxiType == 'diesel
161                 ' else '' }}></option>
162             <option value="ev" {{ 'selected' if taxiType == 'ev' else
163                 '' }}></option>
164         </select>
165     </label>
166 </div>
167
168 <div class="transport-type">
169     <h4    ></h4>
170     <label    >
171         <input type="number" name="shuttleTrips" value="{{
172             shuttleTrips }}" min="0">
173     </label>
174     <label    >
175         <input type="number" name="ebikeTrips" value="{{ ebikeTrips
176             }}" min="0">
177     </label>
178     <label    >
179         <input type="number" name="ebikeAvgDistance" value="{{
180             ebikeAvgDistance }}" min="0">
181     </label>
182 </div>
183
184 <div class="transport-type">
185     <h4    ></h4>
186     <label    >
187         <select name="hsrMonth" class="month-selector">
188             <option value="0" {{ 'selected' if hsrMonth == 0 else ''
189                 }}></option>
190             <option value="1" {{ 'selected' if hsrMonth == 1 else ''
191                 }}>1</option>
192             <option value="2" {{ 'selected' if hsrMonth == 2 else ''
193                 }}>2</option>
194             <option value="3" {{ 'selected' if hsrMonth == 3 else ''
195                 }}>3</option>
196             <option value="4" {{ 'selected' if hsrMonth == 4 else ''
197                 }}>4</option>
198             <option value="5" {{ 'selected' if hsrMonth == 5 else ''
199                 }}>5</option>
200             <option value="6" {{ 'selected' if hsrMonth == 6 else ''
201                 }}>6</option>
202             <option value="7" {{ 'selected' if hsrMonth == 7 else ''
203                 }}>7</option>
204             <option value="8" {{ 'selected' if hsrMonth == 8 else ''
205                 }}>8</option>
206             <option value="9" {{ 'selected' if hsrMonth == 9 else ''
207                 }}>9</option>
208             <option value="10" {{ 'selected' if hsrMonth == 10 else ''
209                 }}>10</option>
210             <option value="11" {{ 'selected' if hsrMonth == 11 else ''
211                 }}>11</option>

```

```

194         <option value="12" {{ 'selected' if hsrMonth == 12 else ''
195             }}>12</option>
196     </select>
197 </label>
198 <label >
199     <input type="number" name="hsrTrips" value="{{ hsrTrips }}"
200         min="0">
201 </label>
202 <label >
203     <input type="number" name="hsrAvgDistance" value="{{
204         hsrAvgDistance }}" min="0">
205 </label>
206 </div>
207
208 <div class="transport-type">
209     <h4 ></h4>
210     <label >
211         <input type="number" name="domesticFlights" value="{{
212             domesticFlights }}" min="0">
213     </label>
214     <label >
215         <input type="number" name="domesticFlightDistance" value="{{
216             domesticFlightDistance }}" min="0">
217     </label>
218     <label >
219         <select name="domesticCabin">
220             <option value="economy" {{ 'selected' if domesticCabin == '
221                 economy' else '' }}></option>
222             <option value="business" {{ 'selected' if domesticCabin ==
223                 'business' else '' }}></option>
224         </select>
225     </label>
226
227     <label >
228         <input type="number" name="internationalFlights" value="{{
229             internationalFlights }}" min="0">
230     </label>
231     <label >
232         <input type="number" name="internationalFlightDistance" value
233             ="{{ internationalFlightDistance }}" min="0">
234     </label>
235     <label >
236         <select name="internationalCabin">
237             <option value="economy" {{ 'selected' if internationalCabin
238                 == 'economy' else '' }}></option>
239             <option value="business" {{ 'selected' if
240                 internationalCabin == 'business' else '' }}></
241                 option>
242         </select>
243     </label>
244 </div>
245
246 <div class="section">
247     <h3 ></h3>
248     <label > kg
249     <input type="number" name="recycledPlastic" value="{{

```

```

239         recycledPlastic }}" min="0">
240     </label>
241     <label         > kg
242         <input type="number" name="recycledPaper" value="{ {
243             recycledPaper }}" min="0">
244     </label>
245     <label         > kg
246         <input type="number" name="recycledMetal" value="{ {
247             recycledMetal }}" min="0">
248     </label>
249     <label         > kg
250         <input type="number" name="recycledCardboard" value="{ {
251             recycledCardboard }}" min="0">
252     </label>
253 </div>
254
255 <button type="submit" "></button>
256 </form>
257
258 {% if result %}
259 <div class="result">
260     <h3 ></h3>
261     <strong ></strong>{{ "%.2f"|format(clothing) }} kg COe<br>
262     <strong ></strong>{{ "%.2f"|format(food) }} kg COe<br>
263     <strong ></strong>{{ "%.2f"|format(housing) }} kg COe<br>
264     <h4 ></h4>•
265     {{ "%.2f"|format(publicTransport) }} kg COe<br>•
266     /{{ "%.2f"|format(taxiTransport) }} kg COe<br>•
267     {{ "%.2f"|format(shuttleTransport) }} kg COe<br>•
268     {{ "%.2f"|format(ebikeTransport) }} kg COe<br>•
269     {{ "%.2f"|format(hsrTransport) }} kg COe<br>•
270     {{ "%.2f"|format(airTransport) }} kg COe<br>
271     <strong ></strong>{{ "%.2f"|format(transport) }} kg COe<br>
272     <strong ></strong>{{ "%.2f"|format(recycling) }} kg COe<br>
273     <br>
274     <h3 >{{ "%.2f"|format(total) }} kg COe</h3>
275     <p >{{ computerHours }} × {{ computerWattage }}W = {{ "%.2f"|
276         format(computerElectricity) }} kWh</p>
277     <p >{{ shuttleTrips }} × 12 = {{ shuttleKm }}</p>
278 </div>
279 {% endif %}
280
281 <div class="footer">
282     <h3 ></h3>
283     <p ></p>
284     <p ></p>
285     <p ></p>
286     <p ></p>
287 </div>
288 </body>
289 </html>
290 ""
291
292 # Emission factors
293 EMISSION_FACTORS = {
294     # Clothing
295     "clothing_production": 7.0, # kgCO2e per piece
296     "clothing_transport": 0.5, # kgCO2e per piece

```

```

291 "clothing_washing_electricity": 0.2, # kgCO2e per wash
292 "clothing_washing_detergent": 0.1, # kgCO2e per wash
293
294 # Food
295 "food_production_veggie": 0.6, # kgCO2e per veggie meal
296 "food_production_meat": 1.0, # kgCO2e per meat meal
297 "food_transport": 0.1, # kgCO2e per meal
298 "food_cooking": 0.1167, # kgCO2e per meal
299 "food_waste": 0.05, # kgCO2e per meal
300 "takeout_packaging": 1.6758, # kgCO2e per takeout meal
301
302 # Housing
303 "housing_electricity": 0.5834, # kgCO2e per kWh
304 "housing_heating": 0.0, # kgCO2e per m²
305
306 # Transportation - Public
307 "transport_bus_metro": 0.05, # kgCO2e per km
308 "transport_bike": 0.0, # kgCO2e per km
309 "transport_shuttle": 0.08, # kgCO2e per km
310 "transport_ebike": 0.02, # kgCO2e per km
311 "transport_hsr_electricity": 0.0188, # kgCO2e per km
312
313 # Transportation - Taxi
314 "transport_taxi_gasoline": 0.25, # kgCO2e per km
315 "transport_taxi_diesel": 0.29, # kgCO2e per km
316 "transport_taxi_ev": 0.085, # kgCO2e per km
317
318 # Transportation - Flight
319 "transport_flight_domestic_economy": 0.14, # kgCO2e per km
320 "transport_flight_domestic_business": 0.28, # kgCO2e per km
321 "transport_flight_international_economy": 0.21, # kgCO2e per km
322 "transport_flight_international_business": 0.42, # kgCO2e per km
323
324 # Recycling
325 "recycling_plastic": -1.5, # kgCO2e per kg
326 "recycling_paper": -0.8, # kgCO2e per kg
327 "recycling_metal": -2.0, # kgCO2e per kg
328 "recycling_cardboard": -0.992 # kgCO2e per kg
329 }
330
331 @app.route("/", methods=["GET", "POST"])
332 def carbon_footprint_calculator():
333     # Default values
334     defaults = {
335         "numClothes": 0,
336         "includeWashing": False,
337         "washesPerCloth": 0,
338         "mealsVeggie": 0,
339         "mealsMeat": 0,
340         "takeoutMeals": 0,
341         "electricityKwh": 0,
342         "dormArea": 0,
343         "computerHours": 0,
344         "computerWattage": 60,
345         "busTrips": 0,
346         "busMetroAvgDistance": 0,
347         "bikeTrips": 0,

```

```

348     "bikeAvgDistance": 0,
349     "taxiTrips": 0,
350     "taxiAvgDistance": 0,
351     "taxiType": "gasoline",
352     "shuttleTrips": 0,
353     "ebikeTrips": 0,
354     "ebikeAvgDistance": 0,
355     "hsrMonth": 0,
356     "hsrTrips": 0,
357     "hsrAvgDistance": 0,
358     "domesticFlights": 0,
359     "domesticFlightDistance": 0,
360     "domesticCabin": "economy",
361     "internationalFlights": 0,
362     "internationalFlightDistance": 0,
363     "internationalCabin": "economy",
364     "recycledPlastic": 0,
365     "recycledPaper": 0,
366     "recycledMetal": 0,
367     "recycledCardboard": 0,
368 }
369
370 result = None
371 calculation = {}
372
373 if request.method == "POST":
374     # Get form data with defaults
375     form_data = {}
376     for key in defaults:
377         if key == "includeWashing":
378             form_data[key] = key in request.form
379         else:
380             try:
381                 form_data[key] = float(request.form.get(key,
382                                     defaults[key]))
383             except ValueError:
384                 form_data[key] = request.form.get(key, defaults[key])
385
386     # Calculate emissions
387     calculation = calculate_emissions(form_data)
388     result = True
389
390 # Merge defaults with form data and calculation results
391 context = {**defaults, **(form_data if request.method == "POST"
392                          else {}), **(calculation if result else {})}
393 context["result"] = result
394
395 return render_template_string(HTML_TEMPLATE, **context)
396
397 def calculate_emissions(data):
398     # Clothing
399     clothes = float(data["numClothes"])
400     include_washing = data["includeWashing"]
401     washes_per_cloth = float(data["washesPerCloth"])
402
403     clothing = clothes * (EMISSION_FACTORS["clothing_production"] +

```



```

402     EMISSION_FACTORS["clothing_transport"])
403     washing_electricity = 0
404
405     if include_washing:
406         total_washes = clothes * washes_per_cloth
407         washing_electricity = total_washes * EMISSION_FACTORS["
            clothing_washing_electricity"]
408         washing_detergent = total_washes * EMISSION_FACTORS["
            clothing_washing_detergent"]
409         clothing += washing_electricity + washing_detergent
410
411     # Food
412     meals_veggie = float(data["mealsVeggie"])
413     meals_meat = float(data["mealsMeat"])
414     takeout_meals = float(data["takeoutMeals"])
415     total_meals = meals_veggie + meals_meat
416
417     food = (meals_veggie * EMISSION_FACTORS["food_production_veggie"] +
418            meals_meat * EMISSION_FACTORS["food_production_meat"] +
419            total_meals * EMISSION_FACTORS["food_transport"] +
420            total_meals * EMISSION_FACTORS["food_cooking"] +
421            total_meals * EMISSION_FACTORS["food_waste"] +
422            takeout_meals * EMISSION_FACTORS["takeout_packaging"])
423
424     # Housing
425     electricity = float(data["electricityKwh"])
426     dorm = float(data["dormArea"])
427     computer_hours = float(data["computerHours"])
428     computer_wattage = float(data["computerWattage"])
429     computer_electricity = computer_hours * computer_wattage / 1000 #
        Convert to kWh
430
431     housing_electricity = max(0, (electricity * EMISSION_FACTORS["
        housing_electricity"]) - washing_electricity)
432     housing = (housing_electricity +
433            dorm * EMISSION_FACTORS["housing_heating"] +
434            computer_electricity * EMISSION_FACTORS["
        housing_electricity"])
435
436     # Transportation - Public
437     bus_trips = float(data["busTrips"])
438     bus_metro_avg_distance = float(data["busMetroAvgDistance"])
439     bike_trips = float(data["bikeTrips"])
440     bike_avg_distance = float(data["bikeAvgDistance"])
441
442     bus_metro_km = bus_trips * bus_metro_avg_distance
443     bike_km = bike_trips * bike_avg_distance
444
445     public_transport = (bus_metro_km * EMISSION_FACTORS["
        transport_bus_metro"] +
446            bike_km * EMISSION_FACTORS["transport_bike"])
447
448     # Transportation - Taxi
449     taxi_trips = float(data["taxiTrips"])
450     taxi_avg_distance = float(data["taxiAvgDistance"])
451     taxi_type = data["taxiType"]
452     taxi_factor = EMISSION_FACTORS[f"transport_taxi_{taxi_type}"]

```

```

452 taxi_km = taxi_trips * taxi_avg_distance
453 taxi_transport = taxi_km * taxi_factor
454
455 # Transportation - Shuttle/E-bike
456 shuttle_trips = float(data["shuttleTrips"])
457 shuttle_km = shuttle_trips * 12 # Fixed 12 km per trip
458 shuttle_transport = shuttle_km * EMISSION_FACTORS["
    transport_shuttle"]
459
460 ebike_trips = float(data["ebikeTrips"])
461 ebike_avg_distance = float(data["ebikeAvgDistance"])
462 ebike_km = ebike_trips * ebike_avg_distance
463 ebike_transport = ebike_km * EMISSION_FACTORS["transport_ebike"]
464
465 # Transportation - HSR
466 hsr_month = int(data["hsrMonth"])
467 hsr_trips = float(data["hsrTrips"])
468 hsr_avg_distance = float(data["hsrAvgDistance"])
469 hsr_transport = 0
470
471 if hsr_month > 0: # Only calculate if month is selected
472     hsr_km = hsr_trips * hsr_avg_distance
473     hsr_transport = hsr_km * EMISSION_FACTORS["
        transport_hsr_electricity"]
474
475 # Transportation - Flight
476 domestic_flights = float(data["domesticFlights"])
477 domestic_flight_distance = float(data["domesticFlightDistance"])
478 domestic_cabin = data["domesticCabin"]
479 domestic_factor = EMISSION_FACTORS[f"transport_flight_domestic_{
    domestic_cabin}"]
480 domestic_flight_km = domestic_flights * domestic_flight_distance
481 domestic_flight_emission = domestic_flight_km * domestic_factor
482
483 international_flights = float(data["internationalFlights"])
484 international_flight_distance = float(data["
    internationalFlightDistance"])
485 international_cabin = data["internationalCabin"]
486 international_factor = EMISSION_FACTORS[f"
    transport_flight_international_{international_cabin}"]
487 international_flight_km = international_flights *
    international_flight_distance
488 international_flight_emission = international_flight_km *
    international_factor
489
490 air_transport = domestic_flight_emission +
    international_flight_emission
491
492 # Total transportation
493 transport = (public_transport + taxi_transport + shuttle_transport
    +
494     ebike_transport + hsr_transport + air_transport)
495
496 # Recycling
497 recycled_plastic = float(data["recycledPlastic"])
498 recycled_paper = float(data["recycledPaper"])
499 recycled_metal = float(data["recycledMetal"])

```

```

500 recycled_cardboard = float(data["recycledCardboard"])
501
502 recycling = (recycled_plastic * EMISSION_FACTORS["recycling_plastic"] +
503             recycled_paper * EMISSION_FACTORS["recycling_paper"] +
504             recycled_metal * EMISSION_FACTORS["recycling_metal"] +
505             recycled_cardboard * EMISSION_FACTORS["recycling_cardboard"])
506
507 # Total emissions
508 total = clothing + food + housing + transport + recycling
509
510 return {
511     "clothing": clothing,
512     "food": food,
513     "housing": housing,
514     "publicTransport": public_transport,
515     "taxiTransport": taxi_transport,
516     "shuttleTransport": shuttle_transport,
517     "ebikeTransport": ebike_transport,
518     "hsrTransport": hsr_transport,
519     "airTransport": air_transport,
520     "transport": transport,
521     "recycling": recycling,
522     "total": total,
523     "computerElectricity": computer_electricity,
524     "shuttleKm": shuttle_km,
525 }
526
527 if __name__ == "__main__":
528     app.run(debug=True)

```

Listing 1: Carbon calculator